

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

Reg. U. S. Pat. Off

Published Weekly

Volume 73

Number 18

JULIAN CHASE, Directing Editor

HERBERT HOSKING, Editor
 P. M. HELDT, Engineering Editor
 JOS. GESCHELIN, Detroit Technical Editor
 HAROLD E. GRONSETH, Detroit News Editor

JEROME H. FARRIS, Ass't Editor
 T. LAWTON SLAUGH, News Editor
 ALFRED F. WADDEL, Ass't Editor
 GEOFFREY GRIER, Art Editor

Contents

News of the Industry	565
Calendar of Coming Events	576
Just Among Ourselves	577
The Horizons of Business	578
Business in Brief	579
Chevrolet Adopts Hydraulic Brake and Improves Cooling System	580
Front Drive Cord with a New System of Independent Suspension Makes Initial Bow	582
Production Lines	585
A Six with New Powerplant and an Eight Comprise the New Studebaker Offerings	586
Willys-Overland Has Six Body Styles	590
Four Six-Cylinder Models Make Up the Reo Line for 1936	591
Lincoln-Zephyr a V-12 on 122-In. Wheelbase	592
New Type Bodies, Two Chassis for 1936 Hupps	595
New Terraplanes Have Longer Wheelbase	596
DeSoto Enters 1936 Market with Restyled Airstream and Airflow Models	598
Graham-Paige Concentrates on Sixes	600
Stout Announces a New Scarab	601
Condensed Engine and Chassis Specifications	602
Three Models Supplement Nash Line	603
Pierce-Arrow Offers Eights and Twelves	604
Air-Conditioning System Now Available	605
Advertisers' Index	69

C. A. MUSSELMAN, Pres. and Gen. Mgr.; J. S. HILDRETH, Vice-Pres. and Manager; W. I. RALPH, Vice-Pres.; G. C. BUZZY, Vice-Pres.

OFFICES

Philadelphia—Chestnut & 56th Sts., Phone Sherwood 1424
 New York—239 W. 39th St., Phone Pennsylvania 6-1100. Chicago—Room 1116 London Guarantee & Accident Bldg., Phone Franklin 9494. Detroit—814 Stephenson Bldg., Phone Madison 2090. Cleveland—609 Guardian Bldg., Phone Main 6860. Boston—301 United Shoe Bldg., Phone Liberty 4460. San Francisco—444 Market St., Room 305, Phone Garfield 6788. Long Beach, Cal.—1595 Pacific Ave., Phone Long Beach 613-238.

Cable Address Autoland, Philadelphia

SUBSCRIPTION RATES: United States, United States Possessions, and all countries in the Postal Union, \$1.00 per year; Canada and Foreign, \$4.00 per year. Single Copies, 25c.

Member of the Audit Bureau of Circulations

Member Associated Business Papers, Inc.

Entered as second-class matter Oct. 1, 1925, at the post office at Philadelphia, Pa., under the act of March 3, 1879.
 Automotive Industries—The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903, the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

Owned, Published and Copyrighted by



CHILTON COMPANY

(Incorporated)

Executive Offices

Chestnut and 56th Streets, Philadelphia, Pa., U. S. A.

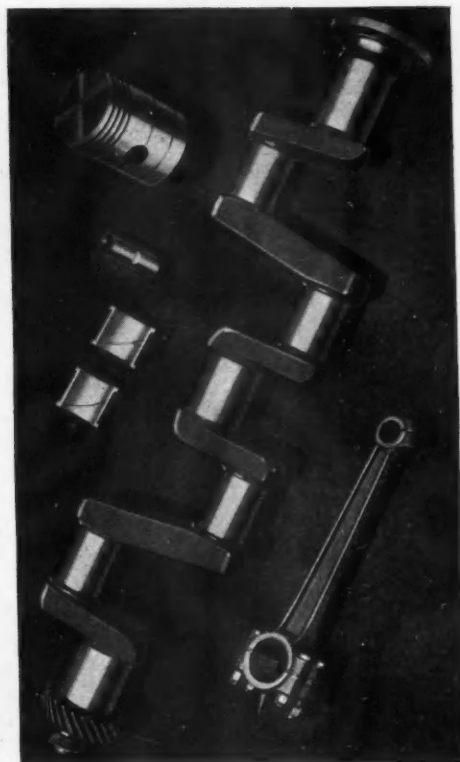
C. A. MUSSELMAN, President

FRITZ J. FRANK, Executive Vice-President

FREDERIC C. STEVENS, JOSEPH S. HILDRETH, GEORGE H. GRIFFITHS, EVERETT B. TERHUNE, ERNEST C. HASTINGS, Vice-Presidents

WILLIAM A. BARBER, Treasurer. JOHN BLAIR MOFFETT, Secretary

Automotive Industries



Safeguard Your New Engine Parts

The vitals of modern automobile engines must function under increasingly gruelling conditions. To protect against these conditions is a simple matter.

By using "dag"* Brand colloidal graphite in setting-up and assembly work, a protective film, known as a graphoid surface, is established on the moving parts. It is particularly important to take this measure of precaution with new cars because no matter how carefully machined, ground or honed the parts have been, they are still surprisingly rough.

Acheson's colloidal graphite, through the medium of the graphoid surface, is in fact a secondary lubricant and will "step in" when oil film rupture occurs.

Write for Bulletin D242 discussing the use of Acheson's colloidal graphite with alloy bearings.

You are cordially invited to visit our Booth 4 at the Detroit Automobile Show, Nov. 9-16.

*Reg. U. S. Pat. Off.

REG. U. S. PAT. OFF.

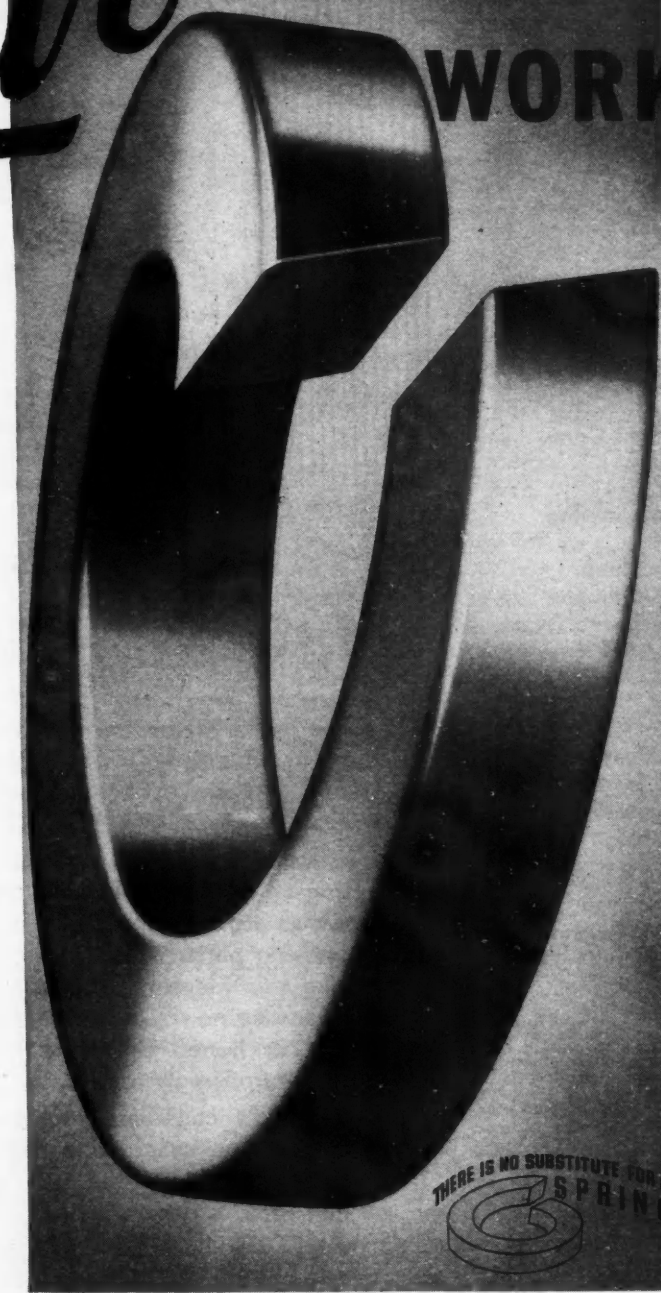
dag

COLLOIDAL PRODUCTS

ACHESON
COLLOIDS CORPORATION
 FOUNDED [1908] AS ACHESON OILDAG COMPANY
 PORT HURON • MICHIGAN

November 2, 1935

A... *Live* CONTINUOUSLY WORKING PART

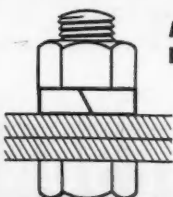


THE SPRING WASHER COMPENSATES FOR WEAR AND LOOSENESS

Only the *Live Action* of a Spring Washer will keep your product tight. A *live* continuously working part, with sufficient range of action to retard wear . . . and to compensate for play. This exclusive feature — *Live Action* — means longer and better service for your product . . . and costs you nothing extra.

Live Action

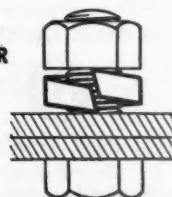
MAKES A SPRING WASHER LOCK! IN SPITE OF PLAY



ALL WASHERS LOCK UNDER A TIGHT FIT



BUT ONLY A SPRING WASHER HOLDS HERE



AND EVEN HERE A SPRING WASHER LOCKS!

SPRING WASHER INDUSTRY

Capacity Output Salutes Show

On With the Show!

"... no backward step can be taken."

President Roosevelt—in message accompanying renewal of the Automobile Industry's Code, Feb. 1, 1935.

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

CLASS OF SERVICE

This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable sign above or preceding the address.

WESTERN UNION

(55)

SIGNS

DL = Day Letter
NM = Night Message
NL = Night Letter
LC = Deferred Cable
MLT = Cable Night Letter
Ship Radiogram

R. B. WHITE PRESIDENT HERSCHEL CARLTON CHAIRMAN OF THE BOARD J. C. WOLFEVIER FIRST VICE-PRESIDENT

The filing time as shown in the date line on full-rate telegrams and day letters, and the time of receipt at destination as shown on all messages, is STANDARD TIME.

Received at 5222 Chestnut Street, Philadelphia, Penn.

PQ208 58 GOVT COUNT ONS=THE WHITE HOUSE WASHINGTON DC 30 522P

HERBERT HOSKING=★

EDITOR AUTOMOTIVE INDUSTRIES=

MAY I THROUGH THE COLUMNS OF YOUR PAPER WISH THE LEADERS OF THE AUTOMOTIVE INDUSTRY A "HAPPY NEW YEAR" STOP INFORMATION AT HAND THAT AUTOMOBILE PRODUCTION FOR THE FIRST EIGHT MONTHS OF THE CURRENT YEAR DOUBLES THE ENTIRE OUTPUT FOR NINETEEN THIRTY TWO GIVES ADDED ASSURANCE THAT THE AUTOMOBILE INDUSTRY WILL REMAIN IN THE VANGUARD OF RECOVERY=

FRANKLIN D ROOSEVELT.

WESTERN UNION CIFT ORDERS SOLVE THE PERPLEXING QUESTION OF WHAT TO GIVE

As the automobile industry's first National Show to be held in November opens its doors in New York, *Automotive Industries* presents Presidential Greetings to the Men Behind the Show. In his message of Feb. 1, accompanying the renewal of the Automobile Industry Code, which carried provision for the November Automobile Shows, President Roosevelt said:

"... introduction of new models of passenger cars in the Fall instead of the Winter ... would result in a greater regularity of work and in

lessening the spread between the peaks and valleys of employment."

"... the members of the industry are required and authorized to enter into agreements with one another with respect to Fall announcements of new models of passenger automobiles and the holding of automobile shows in the Fall of the year."

In the spirit of an outlawed code, the industry has kept faith. See page 568 this issue of *Automotive Industries* for a recapitulation of new-model announcement dates and descriptions.

200,000 Cars In Field for Opening

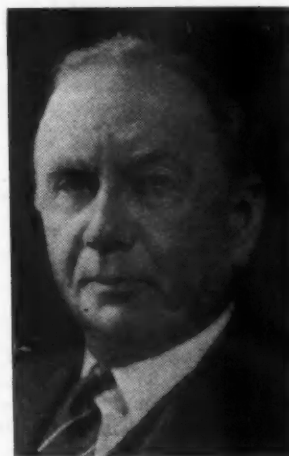
Some Plants Running Ahead of Schedule; Retail Demand High

by Harold E. Gronseth
Detroit News Editor, Automotive Industries

Upwards of 200,000 new-model cars are in the field as the curtain rises on the 1936 offering of the motor industry. Although this supply unquestionably is inadequate and far from evenly distributed throughout selling organizations, the opening of the new sales year finds the industry better prepared to meet anticipated initial demand than it has been for several years. At least production, with few exceptions, is progressing without a hitch and should reach full stride in the course of the current month. Some plants are running ahead of schedule and will show a heavier October output than was thought possible at the start of the month. Only two companies have been delayed with their production programs and these will be under way in good volume by next week.

(Turn to page 576, please)

He Lifts the Lid



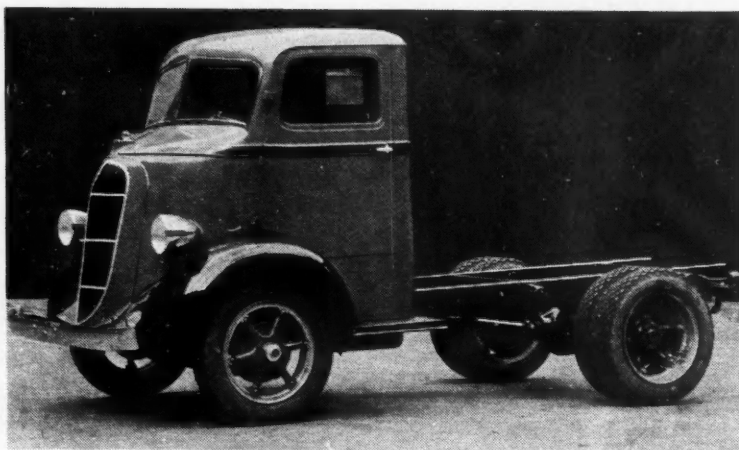
Commerce Secretary Roper
Keynote speaker of New York Show

Chevrolet Greets '36 Cars With 50,000 Breakfasts

As a preliminary to the inauguration of its 1936 sales program, Chevrolet Motor Co., today (Nov. 2), conducted simultaneously 10,000 breakfast meetings attended by 50,000 men representing the entire Chevrolet dealer and retail selling organization. The meet-

ings, held just prior to opening of business on announcement day, were designed for the purpose of getting the entire retail selling organization keyed up to giving the consuming public a complete explanation of all of the features embodied in the new 1936 Master, Standard and truck models. Dealers and their sales and service personnel had previously viewed the new car and studied its construction thoroughly.

New at New Jersey's Truck Show



Studebaker Cab-Over-Engine 1 1/2 ton chassis

With 43 exhibitors, including 16 manufacturers of trucks and several engine manufacturers, the Second Annual Show of the New Jersey Motor Truck Association, held in Newark, Oct. 29 to Nov. 2, assumed more than statewide importance. Thousands of truck operators from New York, New Jersey and Pennsylvania visited the Truck Show and participated in the daily meetings arranged in conjunction with it.

Outstanding novelty of the Show was the new Studebaker cab-over-engine truck in the 1 1/2-ton field. Developed in cooperation with Autocar engineers, the new model was shown for the first time at Newark.

Studebaker has two new cab-over-engine trucks, the Metro Ace of 1 1/2-tons rating and the Metro Boss, of 2-3 tons rating. These models are slightly higher in price than the corresponding models of conventional design. One feature is that the cab doors are hinged forward, which permits of better rear vision for the driver when backing. V-type windshields and large windows give good forward visibility. There are two large ventilators in the cowl. To prevent discomfort to the driver from excessive heat in the cab, the top of the hood is lined with insulating material 1 in. thick.

Careful consideration has been given to the problem of rendering the engine and its accessories accessible for service-

ing, and it is claimed that 90 per cent of the service operations can be effected easier and more quickly on this truck than on the conventional design. Valve tappet adjustments are made from the side and there is sufficient space between the engine and the front wheel to assure comfort to the service man when working on the engine. The entire engine can be removed from the front.

The Metro Ace is equipped with a Studebaker truck engine of 217 cu. in. displacement, developing a maximum torque of 160 lb.-ft. and a maximum output of 75 hp. at 3200 r.p.m. This engine is fitted with a water pump without packing glands. Front and rear axles are of Clark make, the front axle being extra wide to permit of a short turning radius, and the rear axle of the full-floating type.

The larger model has a Waukesha engine of 262 cu. in. displacement, developing a maximum torque of 176 lb.-ft. and a maximum output of 80 hp. at 3,000 r.p.m. This truck has Timken front and rear axles, the front axle also being extra wide and the rear axle of the full-floating type.

The smaller of these two cab-over-engine trucks will be made in one length of wheelbase only, 101 in., while the larger will be available in three lengths, 101 in., 125 in. and 157 in.

Taxes Raise Gasoline to 85¢ Per Gal. in Rome

Italo-Ethiopian complications sent the price of gasoline to 85 cents per gal. in Rome this week, according to the Associated Press. The rise was accounted for in extremely high taxes levied against the fuel.

Domestic consumption is expected to show a big decrease if projected increases in taxi cab rates are made effective. Should

gasoline not be available from foreign sources because of economic sanctions, it is understood the government may restrict the use of private vehicles.

A new note has been struck in the art of painting automobile bodies by the Packard Motor Car Company. Sides of spray painting booths have been made of glass to give a maximum amount of light for the men who wield the paint "gun." Large electrically driven fans pull air from these booths through giant steel stacks, carrying away all the paint fumes which are highly inflammable.

Shipper Sets Rates Eastman Tells MTA

Federal Coordinator
Principal Speaker at
Truck Show Opening

By producing economical, individualized transportation the motor vehicle industry has made it possible for the "shipper to set the rates" in all transportation activities of the future. This was part of the message of Joseph B. Eastman, Federal Coordinator of Transportation, speaking at a dinner sponsored by the Motor Truck Association of New Jersey, held in Newark on the evening of Oct. 29. To upwards of 1000 truck operators who attended the dinner (as part of the Second Annual New Jersey Truck Show program) Mr. Eastman explained that unless the cost of common-carrier transportation is kept below what it will cost the user of transportation to move goods or passengers in his own vehicles, the latter will supplant carrier operations.

Mr. Eastman's talk, largely devoted to explanation of the Federal Motor Carrier Act of 1935, was preceded by a warning from Fred C. Britton, director of the National Highway Users Conference, that the motor-transportation industry is "over regulated and over taxed." This situation remains, he said, in spite of "love feasts" between Roy F. Britton, director of the National following the passage of the Federal Motor Carrier Act, indicating that passage of the Act was the complete answer to operators who wanted regulation and got it.

J. F. Winchester, manager, general automotive division, Standard Oil Co. of N. J., and president of the New Jersey Motor Truck Association, presided at the dinner.

The dinner opened a series of programs arranged in conjunction with the Second Annual Motor Truck Show in Newark. Organizations sponsoring programs during the week of the truck show included, in addition to the New Jersey Motor Truck Association, the Metropolitan Section, Society of Automotive Engineers, the Newark Chamber of Commerce and the New Jersey Highway Users Conference.

Automobile Employment Accession Rate Leads U. S.

The September employment accession rate in the automobile industry was the highest for 12 basic industries studied by the Bureau of Labor Statistics, Department of Labor. Based on each 100 employees the automobile accession rate for September was 10.32 comparing with 4.00 for August and 2.53 September, 1934. The explanation lies in the recall of workmen for 1936 new model production. Detailed figures of the Bureau's monthly study is shown in the accompanying table:

Class of Rates	Septem-ber, 1935	August, 1935	Septem-ber, 1934
Quit	0.79	0.70	0.59
Discharge	0.13	0.19	0.14
Lay-off	2.19	11.81	13.31
Total separation.	3.11	12.70	14.04
Accession	10.32	4.00	2.53

Show Week Calendar

Saturday, Nov. 2—Pontiac breakfast at 8 a. m. in the Silver Grill, Hotel Lexington; National Automobile Dealers' Association annual convention, Nov. 2 to 9, Hotel Commodore; Auburn motion pictures in Oak Room (continued during week).

Sunday, Nov. 3—Automotive Trade Assn. Managers, meeting and luncheon, 11 a. m.

Monday, Nov. 4—International Day Luncheon, 12.30 p. m., Hotel Ambassador; Society of Automotive Engineers annual dinner, 7 p. m., Commodore Hotel; Nov. 4 to 6, National Tire Dealers' Association annual convention, Hotel New Yorker; Bendix meeting, all day, Hotel Lexington.

Tuesday, Nov. 5—Nash luncheon, 12.30 p. m., Hotel Commodore; Graham luncheon, Hotel Biltmore; Auburn luncheon, Hotel Commodore; Automotive Electric Association luncheon, Hotel Astor.

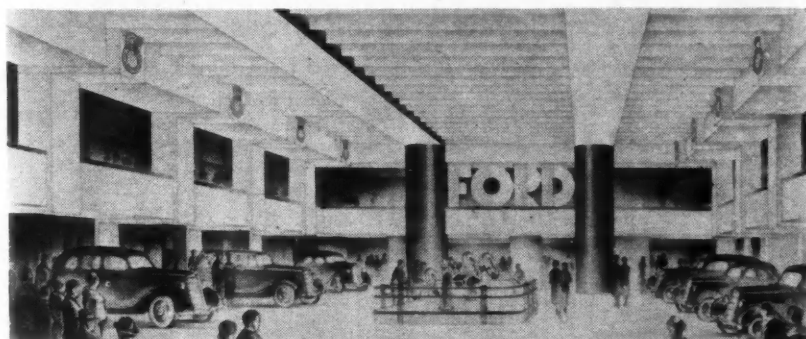
Wednesday, Nov. 6—Hupmobile luncheon, 1 p. m., Hotel Commodore; dinner of the Alumni Association of the Technical School for Automobile Body Designers and Engineers, 7 p. m., Hotel Lexington.

Thursday, Nov. 7—Overseas Automotive Club annual show luncheon, 12.30 p. m., Hotel Lexington; Merchants Association of New York luncheon, 12.30 p. m., Hotel Commodore; Advertising Club luncheon, 12.30 p. m., Advertising Club.

Nash Offers \$10,000 in Prizes for Engine Name

Announcement advertising of the new Nash DeLuxe "400," making its initial appearance at the New York Automobile Show, will center on a \$10,000 cash prize contest designed to secure the best name for a new type engine used in the new car and which was recently developed by Nash Motors Co. engineers.

General Motors paid its first dividend on preferred stock in 1909, the year electric headlights and generators, oil gauges on instrument boards, and four-door bodies were introduced.



Artist's drawing of Ford decorations in Hotel Astor, New York City, for display of 1936 cars. The exhibit opens today, Saturday, Nov. 2.

AMA New York Show Committee



Upper (left to right) Alfred Reeves, AMA vice-president and show manager; Alfred H. Swayne, GM vice-president; Alvan Macauley, Packard president and president of AMA. Lower left Paul G. Hoffman, Studebaker; lower right, Byron C. Foy, DeSoto President.

Chicago Values 1935 Show at \$3,000,000

To Stage Fur Exhibit In Conjunction With Car, Truck Display

Chicago's thirty-sixth annual edition of its automobile show, opening Nov. 16 in the International Amphitheatre, will be one of the most expensive automobile exhibits ever staged, according to the Chicago Automobile Trade Association sponsors. The value of the exhibit is approximately \$3,000,000 including the de luxe motor cars to be shown on a stage in the center of the main show floor, around the enclosure and the various booths. This value also includes the furs to be worn by manikins and sponsored by the Associated Fur Industries of Chicago as an adjunct to the main show.

This year's show will list 29 makes of automobiles as compared with 23 last year. With complete lines, instead of a few selected models, nearly 300 individual models will be on display. Decorative and lighting

effects that will set off the new 1936 creations account for \$40,000 of the \$3,000,000 value placed on the show.

An important innovation, according to the show committee, will be the ingenious use of arrows directing visitors to the International Amphitheatre and through the building itself.

Lincoln Out of AMA; No N. Y. Show Exhibit

The new Lincoln cars will not be exhibited at the National Automobile Show in New York, Nov. 2 to 9, and the Lincoln Motor Co. has relinquished its membership in the Automobile Manufacturers Association. While neither Lincoln nor A.M.A. sources would confirm these facts officially, they have been established by reference to outside sources.

Toledo Plants Employment Show Gain Over Year Ago

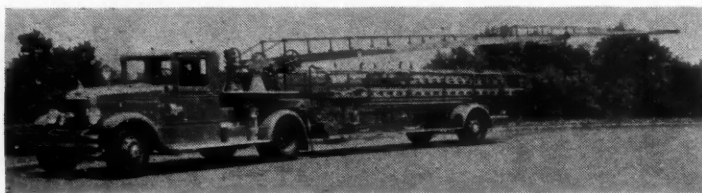
Aggregate employment in 51 Toledo plants at the beginning of the current week was 19,758 persons, this is a decline of 612 from the previous week. A temporary lay-off of workers at the Chevrolet plant was largely responsible for the decrease. These same plants had 13,082 workers on their payrolls at the corresponding time last year.

Sept. Motor Employment Drop Less Than Payrolls

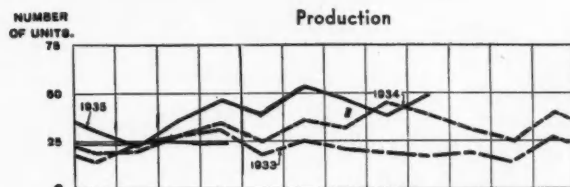
(Federal Reserve Indexes)
1923-1925 = 100

	Sept., '35	Aug., '35 Adjusted	Sept., '34
Employment	91.0	94.9	82.1
Employment	84.0	Unadjusted 95.1	80.9
Payrolls	72.1	80.6	54.3

Fire Apparatus Pumps Production Up



Production of motorized fire-extinguishing equipment has shared general production gains in the automotive industry. Bureau of the Census figures show 363 units produced in first 9 months of 1935; 279 in 1934; 197 in 1933.



GM Los Angeles Plant Work to Start Dec. 1

Assembly Factory for Pontiac, Buick, Olds To Cost \$2,500,000

General Motors will break ground about Dec. 1 for a new assembly plant for Pontiac, Oldsmobile and Buick automobiles in Los Angeles, the first assembly branch to be established by the corporation for divisions other than Chevrolet. The plant will have initial capacity of between 40,000 and 50,000 cars annually and will cost in the neighborhood of \$2,500,000.

A site for the new plant, about six miles from the center of Los Angeles, is under option and architects are to complete plans at once. It is hoped to have the plant in operation by April 1, 1936.

Germany to Survey Cars, Trucks for War Purposes

A nation-wide muster of motor vehicles has been ordered in Germany. The date has not been announced. Drivers of both passenger and commercial vehicles will be obliged to report to special inspectors full details as to their cars so that they may be catalogued regarding their suitability for military use. Car owners were warned to tell the truth about their vehicles.

Chrysler Corp. Calls Third \$5,000,000 Note of Loan

Chrysler directors meeting Thursday in New York voted to retire the third \$5,000,000 note of the \$25,000,000 loan made May 1 to liquidate Dodge Bros. debentures amounting at that time to more than \$31,000,000. The first reduction of this loan was announced July 6 when \$5,000,000 was paid off; a second liquidation of \$5,000,000 was announced August 24 in *Automotive Industries*. This third reduction of the loan, originally written for a period of five years carrying final maturity to 1940, leaves an outstanding balance of \$10,000,000. Liquidation of the loan will materially reduce interest charges to the Chrysler Corp. and

result in substantial savings to the company.

At the same meeting the directors voted a dividend of 75 cents on the outstanding common stock and announced that third quarter earnings for the January-September period this year amounted to \$5.35 per share as compared with \$2.17 for the corresponding 1934 period.

Employment and Payroll Indices Above Production Curve for Motor Industry

That employment and payrolls have not kept pace with the upward trend of industrial production since 1933 became the personal concern of President Roosevelt on Oct. 30, when he told newspapermen that industrial production is about 90 per cent of a base average [presumably the 1923-1925 = 100 averages used in government statistics] while the number of employed is back to 82 per cent and payrolls to only 74 per cent.

To the automobile industry, the President's contentions do not apply. As *Automotive Industries* goes to press with this issue last available government index figures place automobile production for August, 1935, at 69, with employment index at 95 and payrolls at 81, both well above the production index. Other indices, prepared

Lincoln-"Zephyr" Prices

Base prices on the 1936 Lincoln-Zephyr have been announced by the factory. The 2-door sedan is listed at \$1275 and the 4-door sedan \$1320, both f.o.b. Detroit.

CFR Committee Outlines '36 Fuel Study Program

The Cooperative Fuel Research Steering Committee at a meeting on Oct. 29 considered progress reports from its active subcommittees and acted upon recommendations for program for 1936 submitted by a special program subcommittee consisting of the chairmen of these subcommittees, namely: Detonation Subcommittee, Aviation Gasoline Detonation Subcommittee, Volatility Subcommittee, and Subcommittee on Periodic National Gasoline Survey.

N. Mitchell of the Asiatic Petroleum Company and a member of Standardization Subcommittee No. 9 on Knock Rating of the Institution of Petroleum Technologists attended both the C. F. R. Committee meeting and that of the Detonation Subcommittee on the previous day. He presented and solicited comments on a progress report covering recent activities of the British committee on detonation work.

by Marcus Ainsworth, statistician for *Automotive Industries*, on the basis of latest available government figures, show how the automobile industry has maintained consistently its position of keeping employment and real wages high in the face of mounting production, but declining wholesale value of product.

Output, Employment

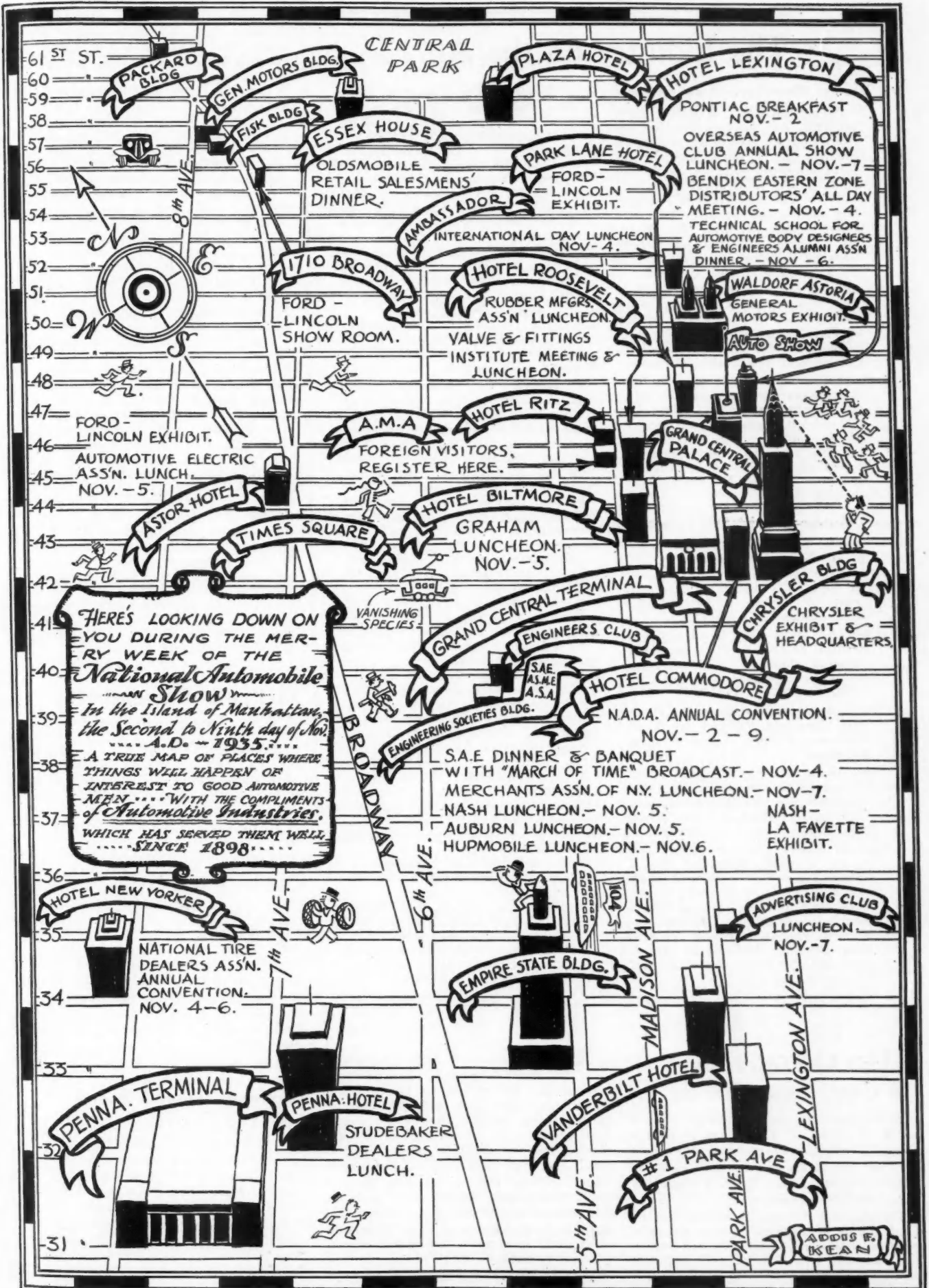
	1935	August 1934	1933
Production			
All Industry	86	73	90
Automobile	69	67	67
Employment			
All Industry	82	79	73
Automobile	95	92	61
Pay Rolls			
All Industry	70	62	56
Automobile	81	76	53
Cost of Living (1923 = 100)	83	80	77
Indices—Unadjusted for Seasonal 1923-25 = 100			

Employment and Payrolls

The Automobile Industry Compared With General Level (First 8 Mos. 1935)

	Payrolls		Employment		Production		Payroll per Worker		Real Wages*	
	All Industry	Automobile Industry	All Industry	Automobile Industry	All Industry	Automobile Industry	All Industry	Automobile Industry	All Industry	Automobile Industry
Jan.	64.1	92.2	78.7	108.1	88	91	81.5	85.1	99.9	104.2
Feb.	69.1	110.3	81.2	117.5	91	89	85.1	93.8	103.3	125.6
Mar.	70.7	112.7	82.4	119.5	91	88	86.0	94.2	104.2	126.7
Apr.	70.8	117.1	82.4	119.9	89	86	86.0	97.8	103.2	124.2
May	68.5	105.1	81.1	116.4	87	85	84.4	90.3	101.9	123.0
June	66.4	93.4	79.6	107.2	86	86	83.4	87.0	100.8	121.0
July	65.3	85.7	79.5	100.6	83	86	82.1	85.7	99.4	120.1
Aug.	69.6	80.6	81.7	95.1	86	86	84.1	84.8	101.3	122.9

* Payroll figure adjusted for cost of living.



The Industry on the Air

Special New York Show Features

"Horseless Carriage," a special show program, will be broadcast by the NBC from its New York studios on Sunday, Nov. 3, 8-8.45 p.m. It will include comedy skits by Fields and Hall; Arthur Allen and Parker Fennelly as "The Simpson Boys"; Honeyboy and Sassafras; and Grace and Eddie Albert as "The Honeymooners." There will also be comedy sketches depicting the evolution of the automobile through the years.

Society of Automotive Engineers, Monday, Nov. 4, 10-10.30 p. m., CBS coast-to-coast network, "The March of Time" broadcast from the annual banquet of the SAE in the Hotel Commodore, New York.

Alfred P. Sloan, Jr., president of General Motors Corp., will speak during the intermission of the General Motors concert Sunday evening, Nov. 3, on the subject of the advancing of the New York show from January to November. The talk will be broadcast over the NBC-WEAF coast-to-coast network.

Automobile Manufacturers

Chevrolet Motor Co. Saturdays, 9-9.30 p. m. 13 weeks beginning Oct. 19. Originating in New York, and sent out over NBC red network, coast to coast, 59 stations. "Chevrolet Presents Rubinoff and His Violin."

Chevrolet Motor Co., Mondays, Wednesdays, Fridays, 9-9.15 p. m., WOR, "Musical Moments," electrical transcriptions featuring Tommy McLaughlin.

Dodge Brothers Corp., Tuesdays, Thursdays, Saturdays, 6.55-7 p. m., WOR, "Dramatic Flashes," electrical transcriptions.

Ford Motor Co., Sundays, 9-10 p. m., thirteen weeks beginning Sept. 29. Originating in Detroit, and sent over CBS coast to coast network, 92 stations. Detroit Symphony Orchestra.

General Motors Corp., Sundays, 10-11 p. m., 13 weeks beginning Oct. 6. Originating in New York, and broadcast over NBC red network, 64 stations, coast to coast. General Motors Symphony Orchestra, assisted by Kirsten Flagstad, Jascha Heifetz, Rosa Ponselle, Jose Iturbi, Arturo Toscanini, Sir Henry Beecham, Igor Stravinsky, and others.

Olds Motor Works, Tuesdays, Thursdays, Saturdays, 6.50-6.55 p. m., WOR, "Breezy Airs," electrical transcriptions.

Packard Motor Car Co., Tuesdays, 8.30-9 p. m., CBS system. Lawrence Tibbett with Don Voorhees' Orchestra.

Plymouth Motor Corp., Mondays, Wednesdays, Fridays, 6.50-6.55 p. m., WOR, "Magic Melodies," electrical transcriptions.

Studebaker Sales Corp., Fridays, 10-10.30 p. m., CBS system. Studebaker Champions with Richard Himber's Orchestra.

Others

Sun Oil Co., Daily, 6.45-7 p. m., NBC blue network. "Radio Personalities" with Lowell Thomas.

Gulf Refining Co., Sundays, 7.30-8.30 p. m., CBS system. "The Great American Tourist," with Phil Baker.

Standard Oil of Indiana, Sundays, 9.30-10.30 p. m. (Chicago time), CBS system (Midwest hookup). Jack Hylton's Orchestra.

Standard Oil of New Jersey, Mondays, 8-8.30 p. m., CBS system. "Lombardo Road," with Guy Lombardo's Orchestra.

Firestone Tire and Rubber Co., Mondays, 8.30-9 p. m., NBC red network. "Voice of Firestone," with Richard Crooks, Nelson Eddy, Margaret Speaks, and William Daly, conductor.

Ford Dealers, Tuesdays, 9.30-10.30 p. m., CBS system. Fred Waring and his Pennsylvanians.

Texas Oil Co., Tuesdays, 9.30-10 p. m., NBC red network. New "Fire Chief" show, broadcasting "Jumbo" serially from the stage of the New York Hippodrome. Jimmy Durante, Donald Novis, Gloria Grafton and others.

Cities Service Co., Fridays, 8-9 p. m., NBC red network. "Cities Service Concert" with Jessica Dragonette, Cities Service Quartet and others.

Socony-Vacuum Oil Corp., Fridays, 8-8.30 p. m., CBS system. "Flying Red Horse Tavern."

Atlantic Refining Co., Saturdays, 7-7.30 p. m., CBS system, "The Atlantic Family."

Shell Petroleum Products, Inc., Saturdays, 9.30-10.30 p. m., NBC red network, originating in Hollywood. "The Shell Chateau," with Wallace Beery, Jack Stanton, Peggy Gardner, Victor Young's Orchestra, and others.

comes to the introduction of radical design. If they click, it usually means that the others have to take notice, and thus a new trend is born. Seaholm also gave credit to the industrial artist who is fast becoming a powerful factor in influencing automobile styling.

Frank E. Watts, of Hupp, noted the definite trend to better fuel economy this year. He also warned the industry to pay more attention to safety on the highways even if this means soft-peddling the emphasis on high speeds. Harry Woolson, of Chrysler, made it plain that the prevalence of detail changes in 1936 models is due, on the one hand to the early announcement date, and on the other, to the continuation of proved units. He also reminded the boys that Chrysler pioneered the overdrive—the rigid frame—and was one of the very first to use aluminum pistons with anodized finish in production.

Stuart Baits, of Hudson, was also a member of the technical team.

Harold Blanchard pleased the boys with his summation of the 1936 cars, although handicapped by the fact that the greater majority of cars may not be discussed before they are made public. According to Mr. Blanchard, both the new Stout Scarab and the rear-engined Briggs cars use the Ford V-8 powerplant. Photographs were shown of the new Graham line and the front drive Cord. Mr. Blanchard described the new system of independent springing on the Cord, comprising a transverse leaf spring in combination with radial arms pivoted at the front cross member.

It was noted that the Cord engine is a V-8 rated 125 hp., and mounted aft of the four-speed transmission which is shifted by means of an improved remote shifter by Bendix. Rzeppa constant velocity joints are used for driving the front wheels.

McKenzie Demonstrates 4 Cyl. Improvements

A demonstration of the improvements made in four-cylinder engineering has just been completed in a 24 hour test run made by Bob McKenzie in a 1936 Willys 77. The car covered 1683.3 miles in the 24 hours at an average speed of 70.13 m.p.h.

Quebec Leads Canada in Gas Taxes, Consumption

The Province of Quebec with 14.65 per cent of the total motor vehicles in the Dominion of Canada, accounted for 18.4 per cent of the total net gasoline consumption and provided 17.6 per cent of the total gasoline tax collected by nine provinces during 1934, according to government statistics for 1934.

Highway Research Board Meets in Capital Dec. 5

The fifteenth annual meeting of the Highway Research Board will be held in Washington Dec. 5 and 6 in the building of the National Academy of Sciences and National Research Council. Topics of interest to the automotive industry listed for discussion include "Wind Resistance of Automobiles," "The Science of Seeing," "Safety Zones," "Inspection of Motor Vehicles," "Accomplishment in Promoting Safety."

Detroit SAE Discusses '36 Cars, Design Trends

Seven passenger car chief engineers, led by W. T. Fishleigh, teamed up to discuss Harold F. Blanchard's pre-view of some of the 1936 cars at the first regular meeting of Detroit Section, SAE. H. T. Youngren of Olds, served as chairman.

The majority opinion, as summarized by Clyde Paton of Packard, is that the independent producers once more are setting the pace with fresh, and on occasion, radical designs which may well set the standard for the industry. Mr. Paton also placed

emphasis on Graham's M. F. Kishline's comment that the industry is heading for better performance—less weight per hp. by reducing weight rather than by further increase in powerplant rating. One of the coming developments in this direction, it was pointed out, is frameless construction, in which the body sills serve as the chassis frame. It was pointed out that the new Cord is an example of this kind, so is the Briggs rear engine job; and one important new car to be announced about Show time will feature an entirely frameless design.

Ernest Seaholm, of Cadillac, was the first to point out that the independents have more freedom of action and less inertia when it

Further Motor-Rail Coordination Need Found by National Resources Committee

Railroads have suffered from motor vehicle competition and from duplication, according to a report released Tuesday by the National Resources Committee, which says that danger of an "oversupply" of transportation facilities is seen by the state planning organization reporting to the committee. The state groups are studying the possibility of eliminating duplicate facilities and consequent evils which "result in idle equipment, cut-throat competition, and ultimately, bankruptcy and unsatisfactory service."

The report, a part of an extended report on state planning by the National Resources Committee, to be completed and made public within a few weeks, points out that "the more recently developed facilities have operated, in a large measure, as competitors of the earlier ones and developed from individual rather than a comprehensive point of view. The result is declared to have been a more or less unavoidable scrambling of transportation facilities."

The committee stated that evidence of need for further progress in the field of coordinating all transport facilities is to be found in the reports of the state planning organizations. Studies are presented of highways, motor vehicles, traffic, port and waterway development and air way transportation.

The steam railroad, the report said, promoted the growth of large urban districts and made possible the establishment of such centers at a considerable distance from navigable waterways. But, it is pointed out, the real creation of the present-day metropolitan region started with the perfecting of electric railways and the gasoline-driven motor vehicle. The motor vehicle, it was stated, has made accessible the areas lying between rail transportation routes so that the various sections of a single state have become physically, as well as politically, part of a single unit for planning.

The importance of coordinating various types of transportation facilities is emphasized in the state planning reports. The object of the state and regional planner, it is declared, is to bring some order out of this chaos and to point out methods by which each of the various means of transportation may be assigned, and, to a certain extent, restricted to its proper sphere.

The Pennsylvania report, according to the committee, exemplifies the general attitude when it states: "The coordination of transportation facilities implies the inclusion of * * * transportation agencies into a general system in which each type of carrier is on an equal basis with all other carriers so that, by united action, they may render more efficient service."

The Chevrolet Motor Company was organized in Delaware in 1915, the year Buick brought out its first "six" and Packard a "Twelve," and aluminum pistons, torsional vibration damper, and self-locking differential were introduced.

Ford Aphorisms

In a copyrighted interview with Fred C. Kelly, NANA writer, Henry Ford said:

"We are constantly in evolutionary process. I know of no way we can suddenly fix everything."

"Part of our troubles are due to human gullibility, and that will last until human beings become wiser. . . . We always imagine ourselves to be the poor innocent victims; we seldom think of ourselves as part of the guilty cause. That's where we gull ourselves again."

"I believe that any stock that is sold should have as real a value as an automobile or a bushel of potatoes, and that the stock market should be and can be run as honestly as a vegetable market."

"If people stay out of war and the stock market, they go along far better."

" . . . industry, manufacturing, is not our principal means of livelihood. Industry will never be able to employ the whole people. The place of industry is not to provide people with their living but to provide them with the things they use in getting a living."

" . . . in the cities it is winter all the time, humanly speaking."

"How can you talk about 'security' without the land? Certainly there is no security in mere money."

"I think it's (the New Deal) probably all good because it gives people experience."

"One thing life has taught me is that what is unworkable can't be made to work."

"The profit of living is life."

"The function of money is to facilitate exchange of goods. If it fails in that, it needs to be fixed."

"The only security I know or can understand comes from the self-dependence of a man who knows how. A man must gain se-

curety for himself But no real security ever comes from an outside source You can't inherit security of any kind."

"Inventive genius has devised new and strange forms of taxes We can't devote our lives merely to producing revenue for a government. Government is certainly not the chief end of human effort."

"Everything needs to be improved. Everything right now is behind the times."

"There will be decided changes (in motor cars), of course. They won't come all of a sudden. We should add improvements as rapidly as we are able to provide them."

" . . . if there were anything I thought I could do better than make automobiles I would do it; but I must stick to what I know best."

Equipment Wholesalers Plan Convention Dec. 6

Preceding the annual Automotive Service Industries Show, convention sessions of the Motor and Equipment Wholesalers' Association will be held at the Claridge Hotel in Atlantic City, December 6 and 7. Meetings of the board of directors and the various committees will occur in advance of the convention.

Recent developments in the trade will be discussed, among which will be the growing demand of the wholesalers for more concentrated action on basic policies and competitive factors, and a discussion of what steps may be taken to eliminate the trend toward a closed market resulting from the alleged practice of conditioning the sale of certain products upon the sale and purchase of other products.

GM-Holden, Ltd., Plans Big Expansion Program

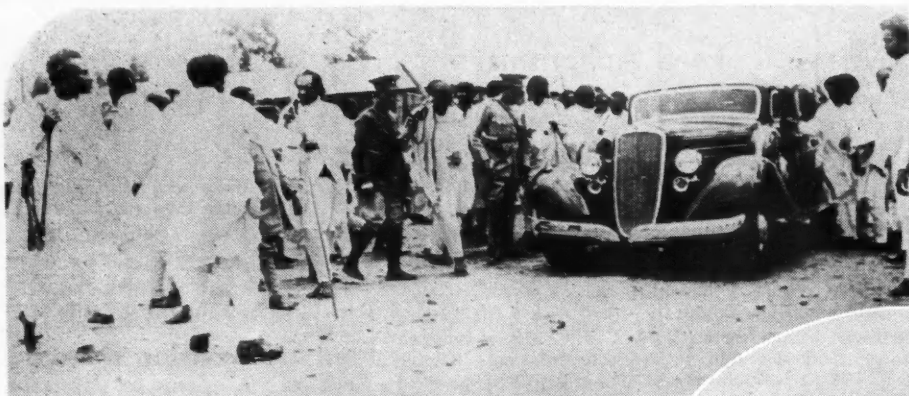
General Motors, Holden, Ltd., Melbourne, Australia, is planning an extensive expansion program, according to word received in this country from John Storey, director of manufacturing of the Melbourne organization.

World Production of Motor Vehicles

	1933 Passenger Cars	1933 Trucks and Buses	Total	1934 Passenger Cars	1934 Trucks and Buses	Total
United States ..	1,573,512	346,545	1,902,057	2,177,919	575,192	2,753,111
Canada	53,849	12,003	65,852	92,647	24,205	116,852
Total	1,627,361	358,548	1,985,909	2,270,566	599,397	2,869,963
Austria	1,150	425	1,575	975	380	1,355
Belgium	800	600	1,400	500	240	740
Czechoslovakia ..	8,670	1,330	10,000	9,110	890	10,000
Denmark	140	140	140	182	182	182
France	163,770	28,159	191,929	172,328	29,316	201,644
Germany	92,610	13,222	105,832	147,330	25,684	173,014
Hungary	143	143	143	19	203	222
Italy	32,000	10,000	42,000	39,907	4,509	43,416
Japan	191	1,617	1,808	930	1,915	2,845
Poland	780	780	780	200	600	800
Soviet Russia ..	10,208	39,467	49,675	17,100	55,366	72,466
Spain	80	295	375	100	730	830
Sweden	700	2,275	2,975	600	2,522	3,122
Switzerland	480	480	480	16	420	436
United Kingdom	216,149	64,377	280,526	264,957	82,899	347,856
Total	527,108	162,530	689,638	653,072	205,856	858,928
Grand Total	2,154,469	521,078	2,675,547	2,923,638	805,253	3,728,891

Marcus Ainsworth, Chilton statistician, estimated the 1934 world total at 3,728,891 units in the Statistical issue of *Automotive Industries*, Feb. 23, 1935. The total estimated for the United States and Canada (in the same issue) was 2,895,629.

The World on Wheels



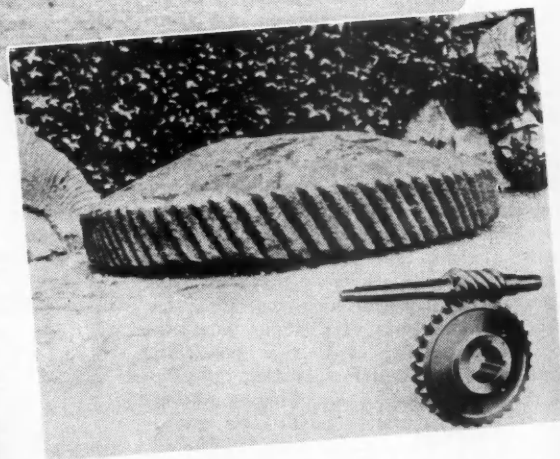
Ethiopian warriors inspect Haile Selassie's Graham supercharged eight when emperor visited training camp

Ethiopian warriors move a motor lorry that sticks in the sands at Bulale. In the background are great herds of camels waiting to be watered

Wide World Photo.

Germany tests gasoline substitutes. A parade of some of the trucks which took part in the 47 day tour of the country fueled with fire wood and other compounds in place of gasoline

Wide World Photo.



A helical gear cut out of stone eight or nine centuries ago bears a striking resemblance to present-day helical gears. The giant stone wheel was discovered by Otto Lundell, president, Michigan Machine Tool Co., in Sweden



Wide World Photo.

Captain K. E. Gimmler wins the Mitchell Trophy in Air Corps' speed classic with average speed of 212.96 m.p.h. Captain Gimmler receives trophy from Col. William Mitchell, donor, center. At right is Col. Ralph Royce, commandant of Selfridge Field



Italian Air Service truck hauling planes in East Africa. The planes will be assembled at Massaua and flown to Mogadiscio

Technical, Mechanical Precision Rules Car Makers' Feature Displays at Show

Striking through the brilliance of the spectacle called the New York Automobile Show the mechanical precision theme dominates this year's exhibition. A preview of car displays reveals the emphasis car manufacturers this year are placing upon the mechanical preciseness with which their products are made; the as-close-to-technical-perfection-as-humanly-possible idea pervades every feature of individual exhibits.

The drama and the magic of a machine are brought to the fore to tell the story of the technical ingenuity and genius that go into the making of a modern automobile. More than ever before will the car user be able to visualize what makes the wheels, which carry him from place to place, go round.

A maze of action and machines. Look around. Packard, Nash, Oldsmobile, Plymouth, Chevrolet, Studebaker, Hudson, Hupp, Dodge, Graham, Pierce-Arrow, Chrysler, Buick DeSoto, Reo and all the others are in the show with graphic, visual displays of their latest developments, intelligible to the uninitiated and interesting to the engineer.

In No. 1 position—Chevrolet on the first floor demonstrates in action in various booths by means of master cutaway chassis knee action, oiling and cooling, synchro-mesh, a brake machine, the valve-in-head and the turret top. In its second floor display Chevrolet has four moving-picture booths showing the progress of a car through the assembly lines and other mechanical features. A third floor display features chromium parts, a cutaway truck axle, a motor that has been run 200,000 miles, six balopticons and a mural of the famous Pike's Peak climb made a few weeks ago.

Turn to Chrysler—here are three deluxe chassis displays on raised dais with lecturers. Here is an overdrive exhibit six feet high, five feet wide and nearly three feet deep in which an actual overdrive transmission used in Airflow models is actuated by a small power motor that can be controlled by the observer by means of a rheostat. In this display the transmission can be speeded to 35 m.p.h., the speed showing on a 20-in. speedometer directly above the transmission. There is a dummy blow-up of the carburetor with glass tube through which a red liquid will drop illustrating the gasoline flow, while oil consumption is shown in another glass-tube arrangement.

On a plate-glass panel is painted a cutaway of a Chrysler engine showing side and end views. Both are animated showing all moving parts of the powerplant in action with gasoline, oil and water circulation.

Striking the fashion note, catering to the feminine instinct, Dodge features a sedan done in "Hunter Green," the color ordained by Paris style makers this year as "smart." Mechanically Dodge features a hydraulic-brake display and its steel body, said this year to be sturdier than ever before.

Pierce-Arrow's exhibit headlines the new heavily girdered frame, increased efficiency

power brakes and the new lighting system installed in this year's cars for benefit of owners who do considerable night driving.

The theatrical, the dramatic, the art of Houdini and Thurston combine in the Packard and Studebaker displays.

Studebaker has tilted a President sedan to 57 degrees, the maximum such a car can tip without toppling. Parts underneath the chassis are painted in various colors so the visitor can read the chassis without explanation. Before this exhibit stands a lecturer with a magic glass wand. As he points to any part his wand, a glass tube, lights. In reality it is a neon tube and illuminates as it is passed into a magnetized field. The central exhibit, a large turntable, has a stationary background showing the 15 "mechanical brains" built into the new Studebaker. In front of the turntable are four demonstrations, one shows a car climbing a hill, stopped at the top by a flasher light but checked from a backward movement by the "hill holder," a device attached to the clutch pedal that holds all the brake pressure built up by the brake itself in bringing the car to a stop.

Packard dramatizes its exhibit with a replica of its proving ground at Utica, Mich. Miniature cars move about simultaneously with car movements at the proving ground. A direct teletype connection is maintained between the Show, the factory and the proving ground and messages are thrown upon a large screen. Any visitor's question is immediately flashed to the factory engineers, the answer or the test made at the proving ground and the results announced by the teletype and the miniature cars reproduce the test being made several hundred miles away.

Another feature of the Packard exhibit is the endurance test that will be run with a 1936 model 120. The test starts with the opening of the show and continues without stop except for refueling and driver changes, until the Show's close. It is expected approximately 15,000 miles will be run in this test at an average speed of 90 m.p.h. A miniature car will duplicate this test.

Hudson, too, features a revolving turntable with a lecturer who can stop the table's movement at any point and hold the display in position while a question is being answered or a part demonstrated. One

feature of the display is the large mirror on the table floor, backed with gold, accurately reflecting every detail of the chassis.

Over at the Plymouth booth visitors find the "Plymouth Oracle," an electrical machine equipped with a series of push but-

(Turn to page 576, please)

Chevrolet Lowers Prices on 3 Master Deluxe Models

Chevrolet has announced that effective with introduction of its new passenger-car models Saturday prices of three of its six Master Deluxe models will be reduced below the levels of the 1935 prices. Other prices in this line will remain unchanged. Master Deluxe models will be available with either conventional spring suspension or with knee action at slight additional cost.

Prices for the new line of Chevrolet Standard models range from \$495 for the coupe to \$600 for the sport sedan. Chevrolet for the first time offers a sport sedan and a town sedan in the Standard line. Like the Master Deluxe Chevrolet, the new Standards have hydraulic brakes and solid steel turret-top Fisher bodies. They are of longer wheel base than the 1935 Standard series.

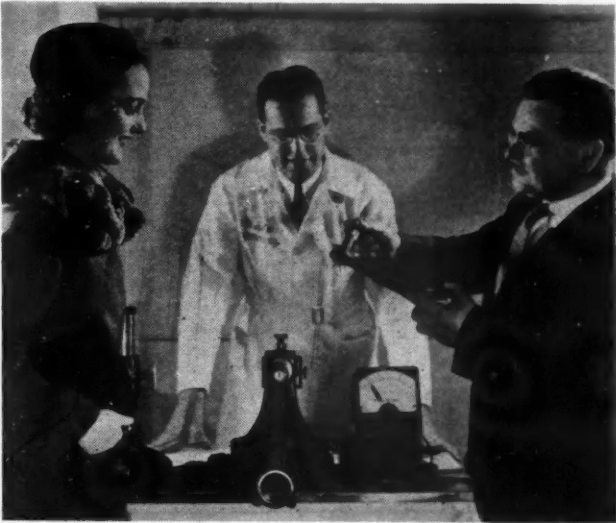
More than 60,000 of the 1936 models were built and shipped up to the end of October and all the 10,000 Chevrolet dealers have received new cars for display and delivery. Production schedules for November and December have been set at the highest figures for any corresponding months in the history of the company.

Chevrolet '36 Prices

	New Price	Old Price	Change
Master			
Coach	\$580	\$580	\$..
Sedan	640	640	..
Town sedan	605	615	— 10
Sport sedan	665	675	— 10
Bus. coupe	560	560	..
Sport coupe	590	600	— 10
Standard			
Coach	510	485	+ 25
Coupe	495	475	+ 20
Sedan	575	550	+ 25
Town sedan	535	...	..
Sport sedan	600	...	..
Sedan delivery...	535	...	..

Farmers use 26 per cent of all trucks, according to the Automobile Manufacturers' Association.

This one for the 1935 Show. In the DeSoto "House of Wonders," Engineers Leavell and Bird demonstrate old hand gages vs. new electrifitechnique



GM Earnings Reflect Increased Car Demand

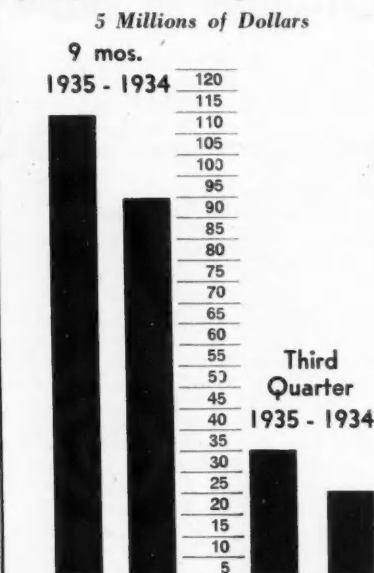
Nine Months' Profit Tops Similar '34 Period by 25%; Third Quarter Shows Gain

The sustained demand for new motor cars both in the United States and abroad that got under way with the opening of the 1935 season and smashed traditional seasonal buying trends is reflected in the nine months earning of General Motors. Earnings of the corporation for the January-September period this year skyrocketed nearly 25 per cent above those for the corresponding 1934 period. Evidence of the sustained buying through the customarily slow summer months shows in the earnings report for the third quarter of the current year when the net profit moved approximately 30 per cent above earnings for the July-September quarter last year.

Earnings for the first nine months this year totaled \$114,482,926 against \$92,445,341 for the same period last year. Third quarter earnings this year were \$30,753,088 against \$22,858,728 for the similar period in 1934. On a per share basis GM earnings for the first nine months of the current year were \$1.51 per common share which compares with \$1.99 per share for the nine months ended September 30 last year. Earnings on the common stock for the third quarter this year were equivalent to \$0.66 per share against \$0.48 for the same quarter one year ago.

The corporation's cash position showed considerable increase at the close of business, September 30. At that time cash, government and other marketable securities amounted to \$219,802,942, comparing with \$207,963,581 for the corresponding period last year. The corporation's net working capital on September 30 was \$314,135,092 which compares with \$288,970,570 for the same date a year ago.

GM 9 Mos.—Third Quarter Earnings



Auburn Diesel-Powered Car Displayed at Show

Auburn is exhibiting a Diesel-powered passenger car at the current New York Automobile Show. Roy H. Faulkner, Auburn president, said:

"It is true we have been experimenting with Diesel-powered cars in conjunction with the Cummins Engine Co. At New York we will show a Cummins Diesel-powered Auburn nine passenger sedan. The first one of these cars has been bought by American Airlines, Inc., and will be used in Chicago to transport passengers to and from the city to the airport."

Navy to Award Contracts for Bombing Planes Jan. 1

Rear Admiral E. J. King, head of the Navy's Bureau of Aeronautics, has announced that the Navy plans awarding contracts for 60 torpedo bombing planes Jan. 1.

Place de l'Opera, Paris, sees more motor vehicular traffic congestion than any other street intersection in the world. Park Avenue and 57th Street, New York, is second.

Automotive Freight Revenues Show Big Increase for Railroads, Swayne Says

While complete figures for the year 1935 are not available, it is evident from data covering the first nine months that railroad earnings are showing handsome increases over the previous year in the freight revenues that accrue from automobile manufacturing activities and from the use of automobiles, according to Alfred H. Swayne, GM vice-president and chairman of the New York Automobile Show Committee of the AMA.

A notable example is found in the number of carloads of gasoline shipped by rail which exceeds by far any other single item in the Interstate Commerce Commission statistics on the shipping of manufactured products, Mr. Swayne said. While gasoline was shipped in negligible quantities up to the advent of the automobile the number of carloads used for automobile purposes in 1934 was 1,140,000, producing railroad earnings of \$153,638,000 which will be exceeded this year.

Railroad earnings on shipments of finished motor vehicle parts and tires will again pass the hundred-million mark and are now estimated at \$109,000,000 based on shipments made up to September 30th, a gain of twenty-nine per cent over 1934.

Iron and steel used in motor vehicle manufacture will produce this year approximately 190,000 carloads of rail freight, and oil, coal, lumber and other supplies 400,000 carloads.

In recent years, one-third of the freight classified as manufactures and miscellaneous in the Commission's statistics and about eight per cent of the products of forests and mines have been traceable to the manufacture and use of automobiles. In 1934, railroad revenue on this freight was \$365,021,000, Mr. Swayne announced.

In addition to these direct sources of railroad revenue, we find that lines in the automobile manufacturing districts have been profiting also by the indirect revenues that accrue in the handling of increased freight, passenger and express business that naturally follows where there is more employment of labor and consumption of goods in the communities served by them.

Nine Months' Earnings Statement

Vehicle Manufacturers		1935	1934
General Motors Corp.		\$114,482,926	\$92,445,341
Studebaker Corp. (March 9 to Sept. 30)		d 1,192,760	d 238,582
Yellow Truck and Coach Mfg. Co.		350,214	
3 companies reported—Total		\$113,640,380	\$92,206,759
Other Automotive Companies		1935	1934
Bendix Aviation Corp.		\$1,959,110	\$1,742,439
Briggs and Stratton Corp.		919,996	541,941
Motor Wheel Corp.		545,582	613,908
Evans Products Co.		294,337	1,256,134
Spicer Manufacturing Corp.		330,263	563,824
Thermoid Co.		120,452	d 859
Allis-Chalmers Manufacturing Co.		1,374,919	d 907,176
Borg-Warner Corp.		4,213,008	2,521,252
Link-Belt Co.		858,927	573,406
Gabriel Co.		d 45,409	d 31,301
Stewart-Warner Corp.		1,329,423	565,782
Kelsey-Hayes Wheel Co.		1,437,225	379,161
¹ Including non-recurring profit of \$503,301.			
12 companies reported—Total		\$13,337,833	\$7,818,511
15 automotive companies—Grand Total		\$126,978,213	\$100,025,270
Miscellaneous		1935	1934
Shell Union Oil Corp.		\$4,411,649	\$550,021
Tide Water Assoc. Oil Co.		5,829,237	4,582,669
Panhandle Producing and Refining Co.		d 9,856	d 130,677
Seaboard Oil Co. of Del. (3rd Quarter only)		374,661	328,703
Commercial Credit Co.		5,523,724	2,705,492
Fisk Rubber Corp.		d 149,495	474,271
Standard Oil Co. of Kans.		39,657	308,627
d—Net loss.			

Steel Price Boost Predicted for '36

Motor Industry Places Impressive Tonnages for Production of New Cars

With automotive commitments for fourth quarter deliveries of impressive tonnages of flat steels placed in the last few days and more automotive business overhanging the market, predictions are freely made that first quarter 1936 prices will be advanced. Current market gossip has it that about Dec. 1, announcement will be made of a mild advance in prices for sheets, strip and wire products, thus affording to consumers an opportunity to cover at least part of their early 1936 needs at old prices.

Those who made the prophecy point out that the recently announced advance of \$1 per ton in the Chicago pig iron market was also made effective after buyers had had an opportunity to cover at the old price. It is also pointed out in this connection that several of the large motor car manufacturers have contracted heavily of late by way of protecting themselves against price advances.

Ford Motor Co. is credited with having purchased around 30,000 tons of sheets and, moreover, to be stocking several hundred thousand tons of other descriptions of steel of its own manufacture in preparedness for an upward turn of the steel market as a whole. Mention is also made of the increasing pressure for upward revision of wage scales brought on steel producers. There is little doubt that some of the steel producers are of the opinion that the time has come when an attempt should be made to lift prices moderately. Others are rather hesitant about resorting to the traditional method of announcing an advance with a view to "smoking out" business at old prices and running the risk of a stagnating market when the higher prices become actually effective. The American Iron and Steel Institute reports 51.9 per cent of ingot capacity employed this week, compared with 51.8 per cent last week. The rate of operations in finishing mills is well maintained.

Pig Iron—It is generally assumed that the \$1 per ton advance announced in Chicago will spread to all pig iron districts, so soon as large melters have had an opportunity to cover their nearby requirements at old price levels. The new Chicago prices are \$20 for No. 1 foundry and \$19.50 for No. 2 foundry and malleable. These levels denote recovery of the market to where it was in the Spring of 1930. In the Detroit market the \$1 per ton advance was announced on Monday.

Aluminum—Middle West secondary aluminum specialists report good demand, a sale of 1,000,000 pounds having been concluded in the Chicago market a few days ago. Scrap prices are easier. The market for primary metal is firm and unchanged.

Copper—Steady progress is being made in expanding domestic consumption of copper,



Alfred P. Sloan, Jr.

"... the public does not want to drive automobiles at excessive speeds, but it does insist on automobiles sufficiently powerful to accelerate quickly and to maneuver easily both in traffic and on the open road."

"... there probably are from 30 per cent to 40 per cent of the men on the payroll during peak production who work right through the in-between lay-off period."



H. J. Klingler



K. T. Keller

"Just as all other phases of automobile engineering improve from year to year, so the driving of cars will become still less dependent on human judgment, more automatic, as time goes on."



Paul G. Hoffman

"All indications point to the 'fightin' year' in a long time."

Thumbnail Opinions

"There is good reason to believe announcement of new models in the late summer or fall might be of advantage. We consider results in our case have been worthwhile."



Alvan Macauley

"... public interest in the fine car is growing stronger each day as a result of the gradual lifting of the depression."



Nicholas Dreystadt

"There is no such thing as the final goal in motor car design. ... The industry will keep going forward as long as motor cars are used."



J. W. Frazer

October sales being estimated to have been heavier than in any other month of the year. Some orders for certain descriptions of copper, placed for delivery next month and in December, are being called for now, buyers asking for this accommodation because they are all out of supplies. The market remains unchanged at 9½ cents, delivered Connecticut, but no one would be surprised by another fractional advance in the near future.

Tin—Announcement of an increase in the export quota from 70 to 80 per cent as of Oct. 1 at a meeting of the International Tin Committee at The Hague had little effect on spot prices. At the beginning of the week spot Straits tin was quoted at 51 cents, a decline of one-half cent from the preceding week's close.

Lead—Broader demand from storage battery manufacturers is noted.

Zinc—Steady and unchanged.

SKF at ASI Show

SKF Industries, Inc., Philadelphia, will exhibit a complete line of ball and roller bearings and propeller shaft boxes in Spaces 135-137 at the Automotive Service Industries Show, Atlantic City Auditorium, Dec. 9-13. Headquarters will be maintained in the Ambassador Hotel.

Hold Road Builders Show in Cleveland Public Hall

Allocation of nearly 200,000 square feet of floor space for exhibits of the American Road Builders Association show in January were completed this week by officials of Cleveland's Public Hall, scene of the recent Machine Tool Show.

Dividends Declared

The Sun Oil Co. has declared an extra 7 per cent dividend and the quarterly regular dividend of 25 cents on its common stock, both payable Dec. 16 to stock of record Nov. 25. The quarterly dividend of \$1.50 on the preferred stock was also declared, payable Dec. 2 to stock of record Nov. 9.

The Automobile Finance Co., of Pittsburgh, announces that 17,483 shares of \$25 par value 7 per cent cumulative preferred stock will be offered at par, and 4302 shares of no-par common stock will be offered at \$30 a share. The company proposes to sell four shares of preferred stock and one of common for \$130.

The first automobile advertisement was placed in the *Saturday Evening Post* in 1900.

Ford Puts Up \$500,000 in Sales Prizes; Chevrolet Offers Dealers Cash Bonuses

Chevrolet dealers who sell more than 200 cars annually are to get a flat bonus of \$10 per car for each car sold in excess of the 200 per year under a plan instituted for 1936 by the Chevrolet Motor Co. The purpose of this plan is understood to be help for dealers in larger centers who carry heavier overhead than those in smaller cities.

No information was forthcoming from the company about a junking plan, reported earlier by dealers to be in process of formulation. The company is understood to be interested, but to have decided on no *modus operandi*.

200,000 Cars in Field for Opening

(Continued from Page 565)

New model introductions already made have given evidence of the extent to which Fall sales will be stimulated by the early announcements. Highly encouraging reports are reaching the factories from dealer points where new models are available. Good floor play has been general at new car presentation; the percentage of buyers among show room visitors is higher than in many years and quick sales are reported common. Country-wide automobile shows scheduled for the next few weeks are expected to open wider the retail demand already in evidence as most buyers prefer to wait until the shows afford them the opportunity of comparing various lines simultaneously.

Until more reports are in no reliable estimate can be made of October retail sales, but it reasonably can be assumed that the past month will represent the year's low for retail deliveries, probably dropping well below the January total of 171,394 cars and trucks which up to that time was the leanest month this year. September registrations, for which complete returns are now available, totaled 200,332 units of which 157,098 were passenger cars and 43,234 trucks. The figure represents many sales made in the more active month of August. Actual sales in September are estimated to have totaled 182,000 units.

Precision Rules Show Features

(Continued from Page 573)

tons. Visitors need only push a button and get the answer to any question they might ask and which is flashed on a screen above the device. No question is barred. A "Floating Power," weight distribution and hydraulic brake exhibits are features.

Pontiac's display, one of the most elaborate this company has ever devised, centers about the "Jewel Case." A cutout motor, electrically operated and so built that water and oil circulation is visible, is mounted on a revolving table and encased in glass, after the fashion of a jewelry display.

A platform resembling three huge Nash trade marks supports a mechanical display showing every working part of the Nash

To promote continued employment of salesmen and as a reward for extra effort the Ford Motor Co. has established a Salesmen's Producers Club to which it is contributing \$500,000 for distribution to winners of a full year's sales contest. In order that salesmen in smaller communities can participate in the contest, as well as those in the larger cities, four goals or brackets have been set up and bonuses are to be awarded on a pro rata basis to those who have attained the goal of 10, 7, 5 and 3 cars per month, with extra credit for commercial sales.

Ford dealers are matching the company awards with equal or larger amounts. Distribution of awards will be made through the various Ford branches. There is no flat increase of 1 per cent to dealers, but additional revenue amounting to 1 per cent will be obtained from added discounts on parts and accessories.

motor in operation. This exhibit is illuminated through translucent material laid in the floor of the stand and from lights placed in the railing that surrounds the exhibit. For the LaFayette display a standard four door sedan is used with regular production cushions so arranged to form a full sized bed, to demonstrate the roominess of this car. The bed is made up with full equipment of sheets, blankets and pillows with a model in bed.

Oldsmobile has seven special exhibits, the largest is a chassis enclosed in an aluminum railing with a black walnut top and occupying a space approximately 11 by 21 feet. This chassis is movable and can be rotated by hand. Behind this is a large cabinet with a ground glass screen upon which is flashed pictures of various mechanical features which could be shown in no other way. The Oldsmobile lubrication system is illustrated in a case containing a crankshaft rotating at 1760 r.p.m. with oil being pumped through holes from the main bearing and coming out of connecting rod bearings.

Nash Prices, 1936

400 Series	
Standard	
3-pass. coupe	\$665
5-pass. coupe	715
Victoria	690
Victoria with trunk	720
Sedan	740
Sedan with trunk	765
DeLuxe	
3-pass. coupe	675
5-pass. coupe	725
Victoria	715
Victoria with trunk	745
Sedan	765
Sedan with trunk	790
Cabriolet	790
Ambassador Series	
Tour. victoria	835
Tour. sedan	885
Ambassador Super. 8	
Tour. sedan	995

LaFayette

3-pass. coupe	\$595
5-pass. coupe	665
Victoria	625
Victoria with trunk	655
Sedan	675
Sedan with trunk	700
Cabriolet	700

Hudson 1936 Prices

Hudson			
	Custom	DeLuxe	Custom
	6	8	8
Brougham	\$730	\$790	\$885
Touring brougham	755	815	910
4-door sedan	785	855	950
Touring sedan	810	880	975
4-pass. coupe	755	810	895
2-pass. coupe	710	760	845
Convertible coupe	Prices not fixed		

Terraplane		
	DeLuxe	Custom
Brougham	\$615	\$665
Touring brougham	635	685
4-door sedan	670	720
Touring sedan	690	740
4-pass. coupe	640	690
2-pass. coupe	595	650
Convertible coupe	Prices not fixed	

DeSoto 1936 Prices

Airstream	
DeLuxe bus. coupe	\$695
DeLuxe tour. brougham	770
DeLuxe tour. sedan	810
Custom bus. coupe	745
Custom coupe	795
Custom tour. brougham	825
Custom tour. sedan	865
Airflow	
Sedan, 6-pass.	1,095
Coupe	1,095

CALENDAR OF COMING EVENTS

SHOWS

New York Automobile Show, New York,	Nov. 2-9
Baltimore Automobile Show	Nov. 2-9
San Francisco Automobile Show	Nov. 2-9
Washington, D. C. Automobile Show,	Nov. 2-9
Detroit Automobile Show	Nov. 9-16
Buffalo Automobile Show	Nov. 9-16
Indianapolis Automobile Show	Nov. 9-16
Newark Automobile Show	Nov. 9-16
Toronto, Ont., Automobile Show	Nov. 9-16
Cincinnati Automobile Show	Nov. 10-16
Pittsburgh Automobile Show	Nov. 11-16
Philadelphia Automobile Show	Nov. 11-16
Toledo Automobile Show	Nov. 15-21
Chicago Automobile Show	Nov. 16-23
Portland, Ore., Automobile Show	Nov. 16-23
Minneapolis Automobile Show	Nov. 16-23
Columbus Automobile Show	Nov. 22-28

Cleveland Automobile Show	Nov. 23-30
Montreal Automobile Show	Nov. 23-30
Peoria, Ill. Automobile Show	Nov. 27-Dec.
Kansas City Automobile Show,	Nov. 30-Dec. 6
Milwaukee Automobile Show	Nov. 30-Dec. 7
Automotive Service Industries Show—	
Atlantic City	Dec. 9-13
National Motor Boat Show, New York,	Jan. 17-25

CONVENTIONS AND MEETINGS

Industrial Materials Exhibit, Hotel	
Astor, New York	Oct. 21-25
S.A.E. Annual Dinner, New York	Nov. 4
American Petroleum Institute Annual	
Meeting, Los Angeles	Nov. 11-14
S.A.E. Pacific Regional Meeting, San	
Francisco	Nov. 18-19
S.A.E. Annual Meeting, Detroit,	
Jan. 13-17, 1936	

JUST AMONG OURSELVES

Today

TODAY, November 2, passenger-car manufacturers, through the Automobile Manufacturers Association, give concrete form to an idea which certain St. Johns among the economists have been crying for years. Simultaneous autumn announcements of new cars, it has been said, will go far toward stabilizing the employment and sales curves of the automobile industry.

Dated by Presidential approval and keynoted in an opening speech by the Secretary of Commerce, this year's New York Automobile Show will be triply blessed by a large measure of the traditional showmanship which has brought the public in thousands to see the industry's new products.

Everything has been done to assure that the show itself shall be worthy of the distinguished experiment of trying to bend the forces of nature and economics to a smoother trend by the simple expedient of predating the announcement of new products which the public wants.

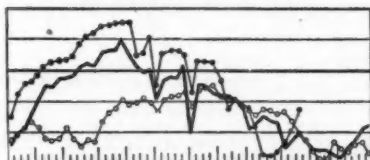
In past years, the data show, those companies which have made a practice of announcing their new automobiles in the autumn months have leveled off somewhat the characteristic March peak in the chart of man-hours employed, substituting therefor two peaks, one in May and one in October, which depart less seriously from the trend of employment for a given year. The success of this plan for a few companies, we believe, has been based on the fact that they were wise enough to see the business possibilities in going against the trend of the industry as a whole and getting into production during the months

when other manufacturers had no new products to offer for immediate delivery.

With the whole passenger-car industry making its new-model announcements at once, the whole industry becomes subject again to fundamental forces which will recreate, we believe, if with slightly different characteristics, a sales and employment curve which retains its monthly peaks and valleys. The employment waves may break at a different time of the year, but they will continue to pound the economic shores with about the same intensity.

Strong as the force of gravity which controls ocean waves are the forces, some natural, some deep-rootedly economic, which influence the seasons when automobiles are bought. There is an indicated correlation, for example, between the mean average temperatures which prevail at different points in the United States and the number of passenger automobiles which are

Smoother in 1936?



Department of Commerce's Weekly Production Chart (1935 to date) for the Automobile Industry. Will the November National Automobile Shows Cut the Amplitude of the Rise and Fall in Employment and Sales?

sold in those areas at different times of the year.

Buying power itself is a seasonable commodity, with peaks and valleys which influence the purchase of automobiles, and all goods of a like durable nature. In spite of the tendency to regard automobiles as necessities, they are purchased under the conditions which govern the purchase

of luxuries. Purchase of an automobile, even on the instalment plan, involves for most consumers the segregation and expenditure of part of their capital.

When factory payrolls are highest seasonally, when corporation dividends make their quarterly rounds, then are most people in the United States in the best position to consider a capital expenditure. As both payrolls for all industry and corporation dividends are subject to seasonal variation, these two items, among many others, will have to be "smoothed" before the employment curve of the automobile industry can be ironed out to ideal evenness. (For a more complete exposition of this thesis see *AUTOMOTIVE INDUSTRIES*, May 24, 1930, p. 800.)

So we await with interest the effect of autumn shows on the automobile sales and employment statistics. If the benefits to the industry exceed our expectations, we shall be the first to hail them.

Windstraw

THE subject of safe-driving of automobiles is as dull as an unstrung puppet to the average citizen. But it can be made to sing and dance, and draw its tribute of tears and laughter, as Eddie Cantor demonstrated on the air the other night. The kidding comic was at his merriest in the middle of a program. With a sudden change of pace he gave the audience a "straight" talk on safe driving, which drew an avalanche of sobered applause. The audience was with him all the way, and the message got home. It took altogether about three minutes.

Safety education has paid its way for hundreds of fleet operators in the transportation field. The automobile manufacturing industry has wisely seized upon it as a sound and humane method of anticipating legislation to restrict the operation of motor vehicles below the point of their greatest utility.

The effectiveness of any safety program rests, however, on its ability to reach human beings in human terms. Let's take a tip from Cantor!

—H. H.

The Horizons of

Recovering the Cost of Production

A CORRESPONDENT makes the point that a producer, in order to survive and be in turn an able consumer of material and labor, must recover from the price of his finished product enough to meet his costs and leave a fair margin of profit. This is a statement to which no reasonable person can take exception. It applies to manufacturer, merchant and farmer. The principle was advanced by our correspondent in defense of the governmentally established minimum price of twelve cents a pound for cotton. He averred that "government economists sought to strike a fair balance" between the cost of producing cotton plus a fair profit on the one hand and the price which consumers could afford to pay on the other.

A Practical Question

It is in the admission that "government economists" tried to regulate supply, demand and price that we discover the real issue. Is it the function of "government economists" to ascertain "fair" profits to the producer and "fair" prices to the consumer? Assuming an affirmative answer we raise the next question. Is it possible for any instrumentality of government to determine profits that are "fair" to one group and prices that are "fair" to another?

The well-meaning and sincere radical asks an entirely different question, "Is it *desirable* that the producer should have a fair profit and that the consumer should pay a fair price?" He offers an unqualified "yes." The

conservative likewise submits an affirmative reply. Distinction emerges the moment the latter explores the road to this happy objective. *How* can we assure a fair profit to the producer and a fair price to the consumer? The radical replies, "The government will do it."

Realistic Idealism

The conservative sees serious obstacles and far-reaching evils in such an attempt. When he demurs he is too often branded a tory and a reactionary. His intellectual integrity is impugned. Yet the difference between the radical and the conservative is simple. The radical is a man with high social and humanitarian aspirations. The conservative is a man with high social and humanitarian aspirations whose effort to attain them is tempered with realism. The conservative will cast the same sincere vote as the radical for higher wages for the worker, better income for the farmer and a more abundant life for all of us.

The Wicked Conservative

The clash is over the means by which these desirable ends are reached. It is here that the conservative shows a real superiority to the radical. He sees the issue clearly. The radical, on the other hand, believes the issue is personal. It inheres, according to his view, in the peculiar selfishness of the conservative, his lack of enlightenment, his willingness to oppress his fellow men and his abhorrence of progress in general. It has been the almost unvarying experience of

this writer that his exposition of what he honestly believes a realistic attitude toward economic problems brings criticism that is heavily freighted with more or less caustic personal reflections.

We have no intention of demonstrating our social purity or parading our humanitarian beatitude. That is not the issue. Can the government ascertain a fair profit to the producer? Is it possible for the government to make such a profit effective?

The Cotton Farmer

More than 900,000 farmers raise cotton. They are scattered throughout 13 states. Many of them raise one or more other crops at the same time that they raise cotton. During the past generation cotton has sold for as little as 5 cents a pound and for as much as 42. At 5 cents some farmers were making a profit. At 42 cents some were still losing money. How much does it cost to raise a pound of cotton? The answer depends upon (1) the weather, (2) the location, (3) the scale of production, (4) the allocation of total costs among the various products raised by each producing unit, (5) the efficiency of labor, (6) the skill of management, (7) the cost of labor and materials, (8) the value of the land, (9) taxes.

Our 900,000 individual producers will have different answers to these questions. It is unlikely that even two of them will have the same answers to all the questions. The problem is complicated by the fact that all these costs, not even excepting taxes, are elastic. They yield to pressure. In the face of low prices for the product they will be forced down. With high prices they will expand.

Assume now that the super-

Business

economists which our government will employ for this purpose eventually evolve an average price and that this average holds for a period of years. Is that the price which will assure fair profits to the producers? It will assure fair profits to *some* of the producers. Measured by the standard some farmers will be making abnormal profits. Others will be headed hopelessly toward bankruptcy unless *they*, the producers themselves, do something about it. These inadequately compensated farmers are consumers. The maintenance of their buying power is just as important both socially and economically as that of the farmers who earn a fair return and those who earn more than a fair return.

Authority in Tough Spot

What shall the controlling authority do now? Shall it raise the price until the least efficient producer on the poorest land is able to make a fair profit? If this is attempted what shall we do about the fellows who are making too much money? What about the consumers? What about the manufacturers who lose their foreign markets? What shall we do about the new areas in other parts of the world which have undertaken cotton cultivation under the stimulus of higher American prices. What about competing materials, hemp, sisal, jute, wood pulp? These are not rhetorical questions in a hypothetical case. Regarding the difficulty of ascertaining and assuring a fair return to the producer we refer the critic to the experience of the Interstate Commerce Commission. If any bright disciple of price and profit control has an answer for the other questions he should get in touch

By Joseph Stagg Lawrence

at once with Secretary Wallace.

Political Processes

In all this we assume the government to be a disinterested agent seeking light on a difficult problem, using its great power judiciously to attain a meritorious end. Such an assumption ignores the essential nature of the American state. We live in a democracy with universal suffrage. The personnel which administers the AAA is selected, indirectly to be sure, by political processes. This means that the President, who appoints the Secretary of Agriculture, and the senators and representatives from cotton areas are elected by the votes of men and women who

must be pleased. Is it reasonable to suppose that any of these public servants would jeopardize their position by applying principles, be they ever so sound, which would irritate or disappoint voters with the power to renew their appointments at the next election?

The critic who objected to our reference to 12 cent cotton held the price to be the scientific resolution of supply and demand forces, properly seasoned with ethical and social considerations, under the direction of an exalted order of economists. If he is right then we are living in two entirely different worlds for that is not what we see.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

General business last week is reported to have registered one of the sharpest gains of the year. Steel operations maintained a steady pace. Retail business continued to improve despite the warm weather, but wholesale business was checked. Department store sales during the first half of October were 12 per cent larger than those in the corresponding period last year.

The Guaranty Trust Company's index of business activity for September stood at 71.6, as against 72.3 the month before and 61.3 for a year ago. The company's index of wholesale commodity prices on Oct. 15 was 56.7, as compared with 54.2 a month earlier and 51.2 a year earlier.

Railway freight loadings during the week ended Oct. 19 totaled 732,947 cars, which marks a decline of 1327 cars below those in the preceding week, an increase of 92,220 cars above those a year ago, and a rise of 75,942 cars above those two years ago.

Sales of 24 store chain companies, including two mail order houses, during September were 6.9 per cent above those a year

ago. Sales of the same companies during the first nine months of this year were 9.3 per cent above those in the corresponding period last year.

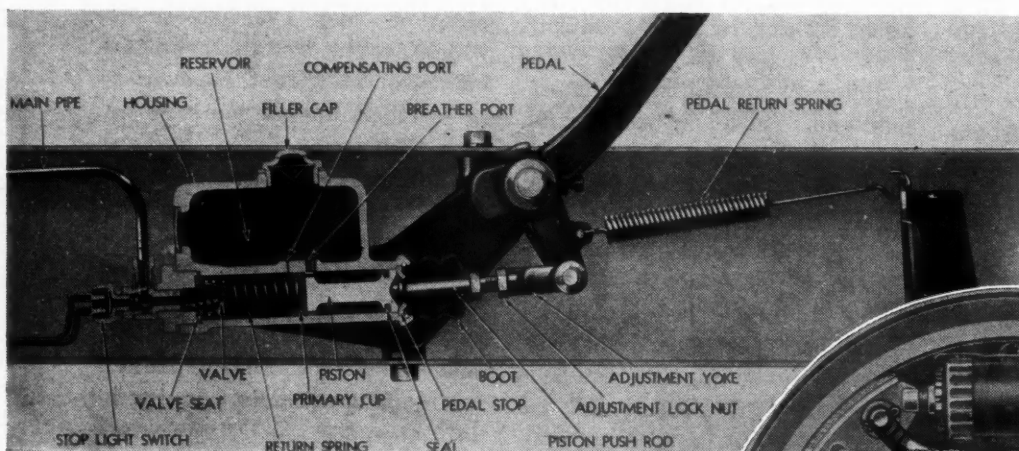
Production of electricity by the electric light and power industry in the United States during the week ended Oct. 19 was 11.7 per cent above that in the corresponding week last year.

Average daily crude oil production in the United States for the week ended Oct. 19 amounted to 2,782,800 barrels, as against 2,781,750 barrels for the preceding week and 2,379,650 barrels a year ago.

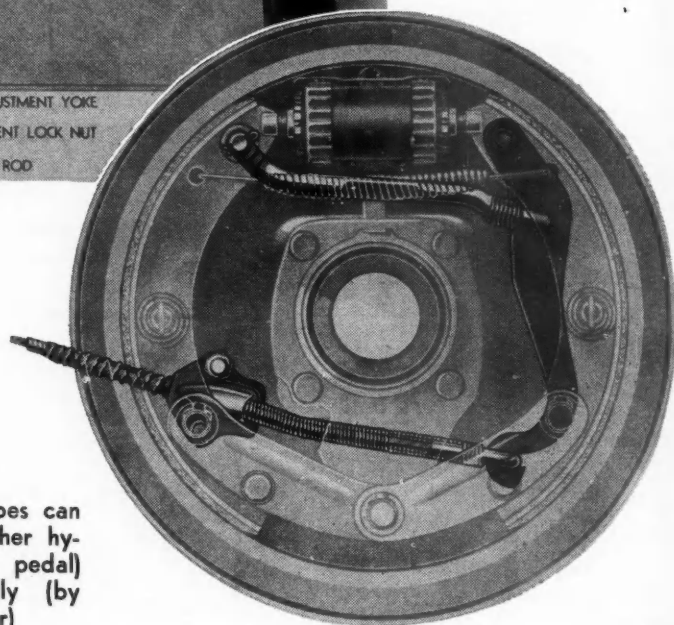
Professor Fisher's index of wholesale commodity prices for the week ended Oct. 26 stood at 85.3, as against 85.5 the week before and 85.8 two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended Oct. 23 showed a decline of \$2,000,000 in holdings of discounted bills. Holdings of bills bought in the open market and of government securities remained unchanged. Money in circulation declined \$12,000,000, and monetary gold stocks increased \$45,000,000.

Chevrolet Adopts Hydraulic System—Standard Models Have



Details of master cylinder and reservoir of hydraulic braking system



Rear brake shoes can be applied either hydraulically (by pedal) or mechanically (by hand lever)

A MASTER deluxe line and new lower priced Standard models are offered by Chevrolet for the 1936 market. The Master deluxe, available with either knee action or conventional springing, has been restyled to feature a higher and narrower radiator and a hood with a distinctive radiator grille. Standard models are completely redesigned as to chassis and bodies and are identical with the Masters in all major features of styling, design, and performance. The chief difference between the two is in the wheelbases, that of the Standard having been increased to 109 in., while that of the Master remains 113 in.

Engines are the same for both models (six cylinder, 35/16 by 4-in., 206.8 cu. in. displacement). Both are rated at 79 hp. at 3200 r.p.m. with new combustion chamber design and a compression ratio of 6 to 1. Full-length water jackets improve cooling and a new carburetor results in better gasoline economy.

Other features of both Master and Standard models are hydraulic brakes and cromodine rust-prevention treatment of fenders and running boards. Front doors of all models of both lines are now hinged at the front, as a measure of safety and convenience. The solid-steel turret top, restricted last

year to the Master models, is now found on the Standard line also. Spoke-type pressed steel wheels are used on all Standard models. The line of body types for Standard models has been increased to seven by the addition of a four-door sport sedan with built-in trunk, a two-door town sedan with built-in trunk, and a cabriolet.

Body interiors of both models show marked advances in comfort and style. The front seating arrangement of the Master coach and town-sedan now features a single seat cushion which extends the full width of the car, permitting three passengers to ride comfortably. The seat-back is divided, the right-side section being hinged to fold forward over the seat cushion to open

a passageway to the rear compartment.

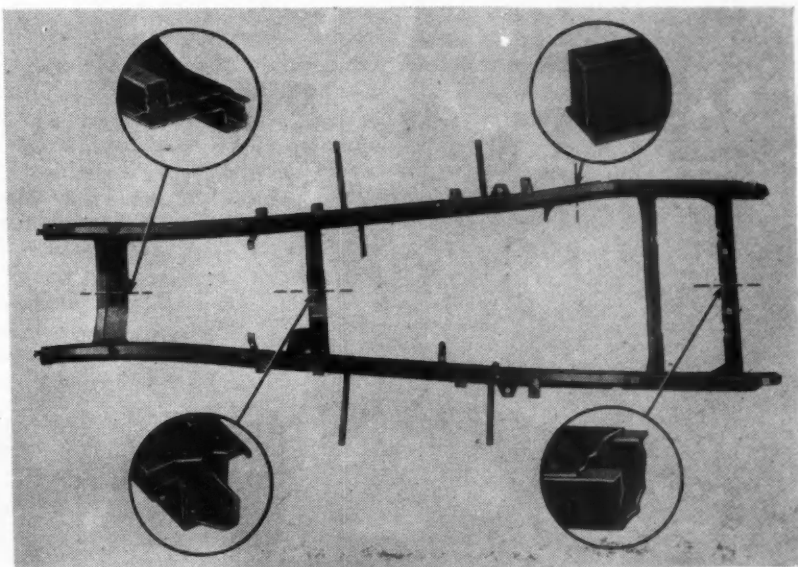
Side-rails and cross members of the Standard frame are all of rigid box section. The box girder members add so greatly to the rigidity of the structure that only three cross members are required. The simplified frame facilitates access to chassis units for lubrication and service operations.

A new "shot-blast" process is applied to the cushion springs of the clutch disc. More accurate alignment of the release levers is another clutch improvement. A rail-type shifting mechanism, with positive interlock, has been substituted for the plate type formerly used. Fuel tank capacity is 14 gal. The generator is ventilated.

Brake and Improves Cooling New Springs and Suspension

Combustion chambers are reshaped to attain smoothness with higher compression. A "balanced" carburetor is another innovation, designed to promote fuel economy and easy starting. The pressure in the float chamber is balanced with that inside the carburetor intake, to give a constant ratio of air to gasoline in the fuel mixture and to offset the choking effect that gradually increases as the air cleaner becomes clogged with dust.

Improvements have been made in the cooling system. The chief change is the adoption of full-length water jackets which extend nearly to the lower edge of the piston skirt at the bottom of the stroke. The most valuable effect of full-length water jacketing is that on the engine oil temperature. Previously the engine oil would attain a temperature 125 deg. higher than that of the water. Now it runs 50 deg. lower than formerly. Additional cooling of the oil supplying the valve rocker shaft is effected by running the supply line through the cylinder block, surrounded by water, where the oil temperature is further reduced 10 deg. The new system not only keeps the oil cooler in normal operation, but warms up the oil supply to the valve mechanism more quickly



Details of the new chassis frame

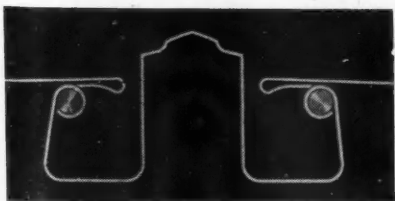
after a cold start. The water capacity of the entire system, formerly 11 quarts, is now 15.

In changing to hydraulic brakes, Chevrolet adapted the principle to its own brake mechanism design. Instead of the cable-operated floating cam formerly used at each wheel, a master hydraulic cylinder with double, opposed pistons is used to actuate each pair of one-piece articulated brake shoes. The master cylinder is mounted on the frame. The master piston is 1 in. in diameter. Wheel pistons are larger,

to effect an increase of braking effort at the wheels. Larger pistons are provided at the front than at the rear wheels, to prevent locking of rear wheels by heavy brake applications. The hand brake lever actuates the service brake shoes in both rear wheels. The connection is by flexible cable, connected to a lever and toggle mechanism within the rear brake drums.

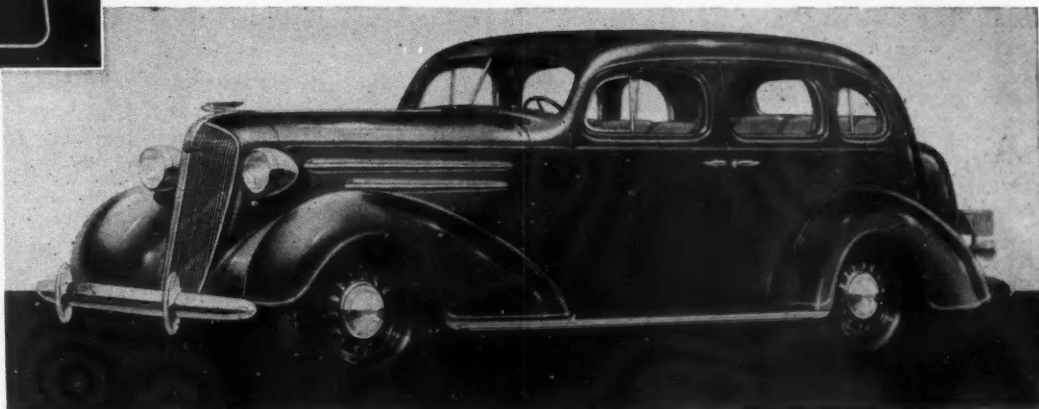
On the Masters, brake drums are of composite construction, comprising a cast-iron rim and a pressed-steel web.

(Turn to page 590, please)

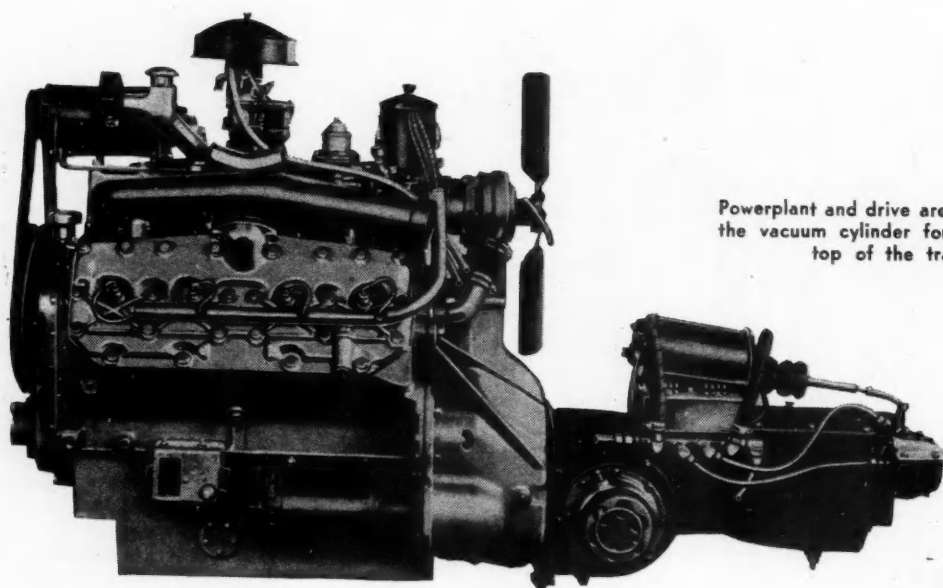


Hood hinge

Chevrolet 1936 four-door sedan



Front Drive Cord with a Independent Suspension



Powerplant and drive are in one unit. Note the vacuum cylinder for the gear shift on top of the transmission

Front end of the Cord chassis showing the independent suspension, center steering, engine mounting and transverse springing

A FRONT-DRIVE Cord with distinctive body styling and many new features has been groomed as the leader of the Auburn line for 1936. It represents several years of engineering development and styling, and incorporates some chassis units that will be shown for the first time.

Four models will be available, known, respectively, as the five - passenger Westchester Sedan, four - passenger Beverly Sedan, two-passenger convertible coupe with rumble seat, and five-passenger convertible phaeton sedan. Interiors and exteriors are in two-color custom finish.

Water and oil filling spouts are located under a small hinged door in the cowl panel directly in front of the right windshield, so it is not necessary to raise the hood for filling-station service.

A top speed of better than 95 m.p.h. is claimed, and the new independent front suspension is said to assure excellent riding qualities.

The front end comprises a new system of independent suspension by a single transverse leaf spring in combination with two swinging arms, one on each side, pivoted at the front cross-member. A V-8 Lycoming engine was specially designed for this application.

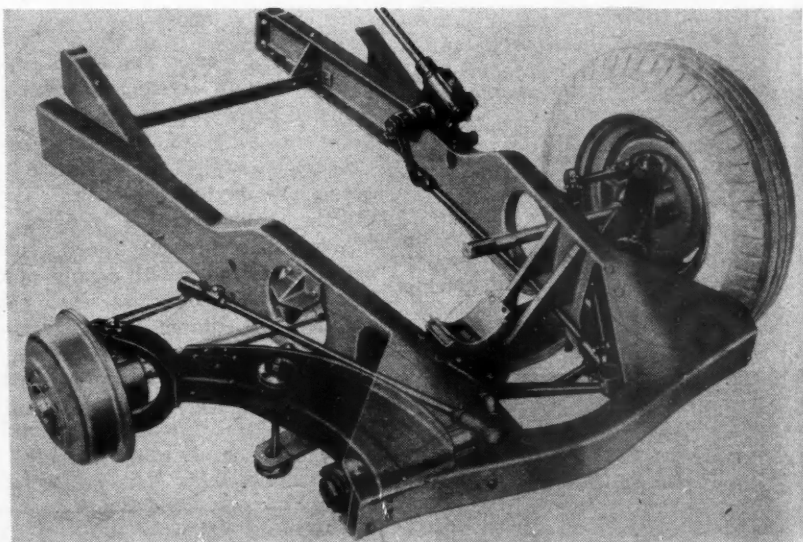
It is a relatively short engine, having a 3½-in. bore and a 3¾-in. stroke (288.6 cu. in. displacement) and it is rated at 115 hp. at 3500 r.p.m.

The transmission has four forward speeds and incorporates a system of constant-mesh helical gears of fine pitch designed for quietness. Drive to the front wheels is through Rzeppa constant-velocity universal joints. The clutch is the 10-in. semi-centrifugal unit by Long. The rear axle consists

of a large diameter steel tube with spun ends for connection to the wheel spindles.

Powerplant suspension is three-point, with two rubber doughnuts at the rear of the engine and a single rubber bearing under the transmission case. Gear shifting is by "remote control," use being made of an electric-and-vacuum-cylinder unit developed by Bendix.

The line is mounted on a 125-in. wheelbase chassis, the tread being 56



a New System of Makes Initial Bow

in. at the front, and 61 in. at the rear. The curb weight with sedan body is about 3500 lb. About 55 per cent of the weight is on the front wheels, 45 per cent on the rear. Brakes are hydraulic, 11 in. in diameter, with linings $2\frac{1}{4}$ in. wide. Tires are 16 x 6.50-in., 6-ply, with white side walls. The sway stabilizer at the rear is attached to the shock absorber arms.

Accessibility of the powerplant and drive mechanism has been one of the chief aims of the designers. The hood section is made in three parts—the hood top hinged at the body cowl, the chrome-plated Venetian-type louver section, which can be removed when necessary, and a separate front cover. For all ordinary adjustments the engine is rendered accessible by lifting the hinged hood. To facilitate major repairs and complete overhauls on both engine and transmission, the entire unit is designed to be lifted right out of the chassis, after the drive shafts and engine controls have been disconnected.

Apart from distinctive styling, the body has many features of interest,

including a solid steel roof and provision for thermal and sound insulation. The over-all height of the sedan is only 60 in. V-type windshield sections opening outward are inclined at 45 deg. There are no running boards. To obtain clean sweeping lines, all external fittings and protuberances have been eliminated. Door handles are concealed and the headlamps are retractable in the front fenders. Even license plates and tail lamps are built flush with the body panels.

Frame construction is unique. The main chassis frame, running back from the cowl, is an integral part of the body structure. The front section of the chassis is a sort of sub-frame, carrying the powerplant units, and is bolted directly to the body frame at the juncture of side rails with diagonal braces running from the sub-frame to the cowl cross-member.

An airplane-type instrument board serves to dress up the interior. For greater safety in driving, gear shifting is effected by means of a finger lever on the steering post, and shifts can be made without taking the hand off the wheel. For the same reason, the horn is sounded by a separate wheel within easy reach of the thumbs, while both hands are on the wheel.

The engine has three $2\frac{1}{2}$ -in. main bearings. Aluminum pistons have a domed head. The compression ratio is 6.5 to 1. Rods are babbitted with SAE No. 11 virgin metal. Manifolds and cylinder head are of aluminum alloy. The

valves are inclined toward the cylinder axes.

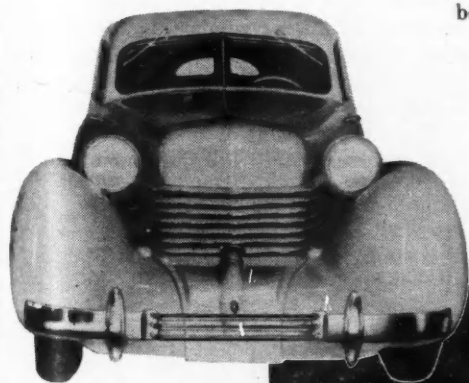
To adapt the engine for use on both front- and rear-drive chassis, it was so designed that accessories can be driven from pulleys on shaft extensions at both ends. In the Cord the water pump is driven by belt from the front end, while the generator and ignition unit are driven from the rear end.

Startix, an Auto-Lite ventilated generator with voltage regulation, an AC air cleaner, and a Delco-Remy ignition unit are standard equipment. The carburetor is a Stromberg EE-1 duplex. Each branch of the inlet manifold serves a group of two inner and two outer cylinders, to assure satisfactory distribution.

The drive in all forward speeds is through a pair of gears from the main to the countershaft and from the latter to the large differential ring gear. As shown in the cross-section, the remote-control shifter unit is mounted right off the front end of the transmission housing, where it is accessible through the front cover. The gears low down at the forward end of the gearbox constitute an oil pump for the unit, providing positive pressure circulation of lubricant to all gears and bearings.

To accommodate the universal joints, brake mechanism, and other mechanical details, a deeply-dished pressed wheel has been produced for the Cord front-drive by Motor Wheel. There are a series of matching punched holes in both the hub cap and wheel for ventilation of the brake drum.

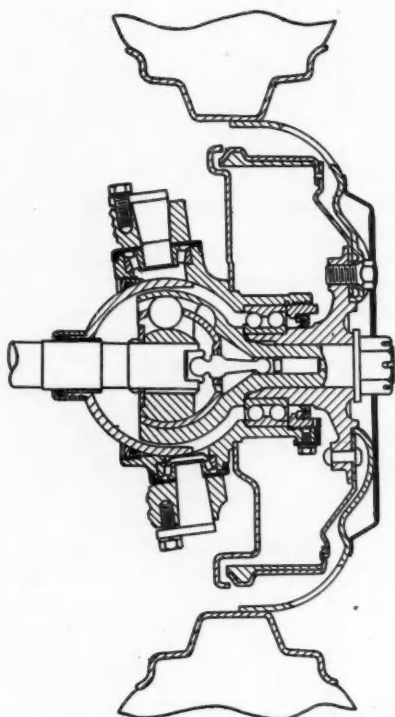
Owing to the need for space economy, a single double-row ball bearing of the heavy-duty type is used in each front wheel.



From the front the new Cord presents a distinctive appearance

Side view of the Cord front-drive car with four door sedan body





Section through front driving wheel

To facilitate assembly and service operations, the Rzeppa joints are held in place by the yoke ends of the swinging arms which are anchored by special tapered pins at each end. There is no load on the pins, the thrust being taken by small Timken bearings against the face of the swinging arm yoke. The joint may be readily disconnected by loosening the taper pin fastening bolts and knocking out the taper pins.

The king-pin inclination is such that the king pin axis intersects the center of tire contact with the ground. It is claimed that this assures perfect center-point steering regardless of caster variation. The front suspension is of the swinging arm type, in conjunction with a single transverse leaf spring. Two arms are used, one on each side, pivoted at the front cross member and having a yoke at the free end attached to the Rzeppa joint at the wheel. This gives the effect of a three-point suspension for the entire body and chassis structure. The spring connects to each arm by means of tension rods.

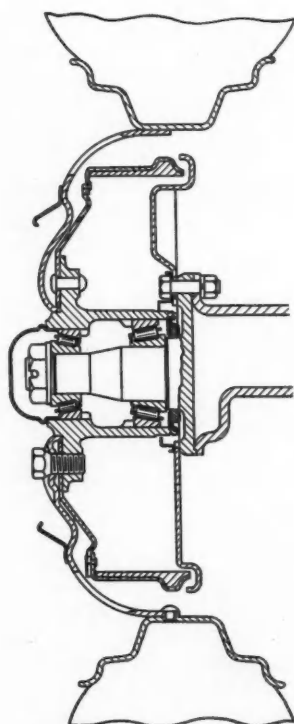
The maximum deflection of the front spring does not exceed 2 in., and road tests are said to have shown that shock absorbers are not really necessary. Nevertheless, inertia-type "shocks" are fitted all around to take care of rebound conditions. These have extra large orifices at the center position,

so that shock absorber action is confined to maximum rebound.

Two different types of bearings are used for the swinging arms—a needle bearing on the inside, and a newly-developed double-row Timken roller bearing on the outside, the latter taking all thrust.

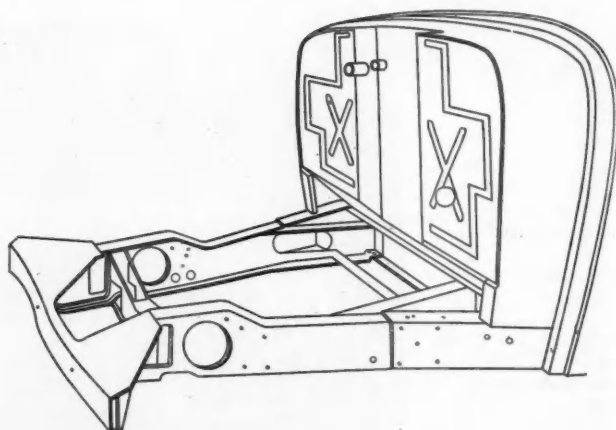
The levers of the steering linkage form a Y, the two outermost pivots being in line with the yoke centers at the wheels. The drag link connects to one branch of the Y, the tie rods from the knuckle arms to the ends.

While the body styling is brought out by the illustrations, many important details of body construction are not evident in the outside view. It is an all-steel structure with a solid steel roof thoroughly insulated against sound, heat, and cold. The underside



Section through rear non-driving wheel

Showing how short frame members are secured to front of all-steel body



of the roof panels, as well as body side panels, are insulated against sound and vibration by a sheet of Johns-Manville waffle paper composition material. Fenders and underbody are coated with a new Mortex plastic sound-deadening material which is sprayed on. Special precautions were taken to seal all openings in the cowl to prevent heat from the engine compartment entering the body.

Several drawings reproduced here show some of the details of body construction. One shows the full box-girder sill which extends the full length of the body. The other is a detail at the center pillar, illustrating the novel concealed hinge design. The hinges are shown at A, while B is a cast strip so formed that the outer portion of the hinge as well as the edge of the door panel will slide into the pocket.

Upholstery springs are set in individual pockets which are interlaced to maintain their alignment. The lounge-type front seat has a 4-in. fore-and-aft adjustment. Passengers in the rear seat sit on the same level as those in the front, and well forward of the rear wheels. The floor of the body is only 10½ in. off the ground, permitting passengers to step out without the aid of running boards.

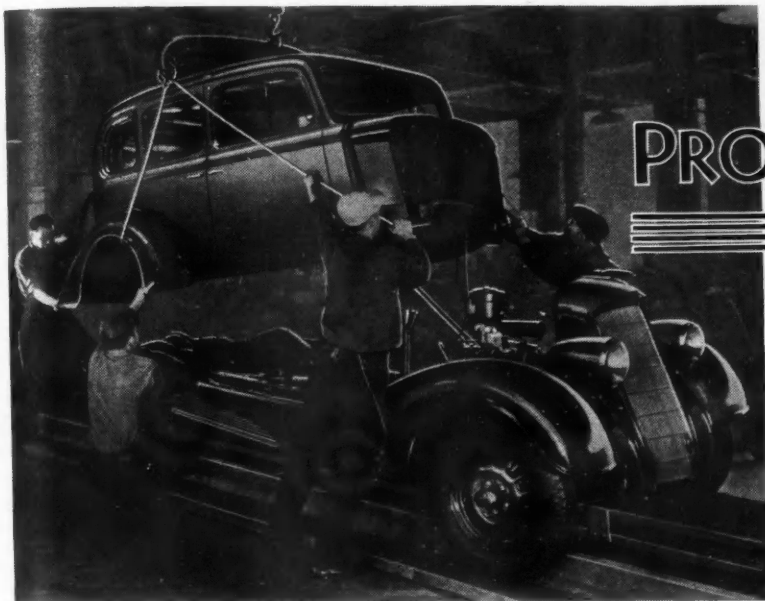
Comfortable arm rests, leather robe rails, two glove compartments, and safety glass all around round out the interior appointments of the line.

English broadcloth upholstery obtainable in Banks blue, Manchester maroon or sea green, has been chosen to contrast with the exterior of the car. Manchester maroon upholstery, for instance, is used in combination with an exterior dawn gray finish. The entire interior then is carried out in this two-color motif. Door-window knobs, control buttons, upholstery and ceiling-panel piping, etc., are finished in the same color as the exterior of the car.

The luggage compartment and extra tire space are built into the rear of the

(Turn to page 608, please)

PRODUCTION LINES



Cast Metals

A handbook devoted exclusively to cast materials has been published by the American Foundrymen's Assn. Its eight sections cover the entire subject from the point of view of engineers, purchasing agents, metallurgists and foundrymen. Sections are devoted to properties and applications of cast iron, malleable iron, steel and non-ferrous metals. Emphasis is given to special properties such as heat, corrosion and wear resistance. The "Cast Metals Handbook" contains 512 pages, 125 tables, 130 illustrations. Price to non-members of the AFA is \$4.

Hot Battery

Hugo K. Moren describes in recent correspondence the details of a new type of storage battery developed in Sweden. The Nobel battery is of the alkaline type. It is 59 per cent lighter than the best European battery of prior production and is only about 15 per cent of the former size. Internal resistance is considerably lower than usual, which is said to make it particularly desirable for starting service demanding short, severe discharge rates. According to Mr. Moren, who is well known in Diesel circles in this country, the battery is now commercially available. Let us know whether you're interested.

Front Alignment

Discussion of front wheel alignment has lagged somewhat in recent months. And we had an idea that the whole thing was under control. Ap-

parently it isn't. We learn that one of the great tire companies finds front wheel alignment to present fresh and difficult problems. We hope to follow the progress of their investigation and give you an early report. Meanwhile your ideas on this subject would be helpful and we'd be glad to pass them on.

Surface Broach

Your scribe and a great group of machinery builders who helped pioneer surface broaching owe a vote of thanks to *Engineering* (London). This publication recently published an abstract of our SAE paper on surface broaching in three installments. Look for the issues dated July 26, Aug. 9 and Aug. 30.

Diesel Service

A report on diesel maintenance experience is gleaned from our recent correspondence. Purity Stores of San Francisco, operating a fleet of 16 Cummins diesels, tells us that in the case of one of their new engines they expect to run 100,000 miles before overhauling. Already this engine has served for 87,000 miles without dropping the pan. Valves were ground at 74,000 miles.

Cutting Oils

D. A. Stuart distributed a revised edition of their booklet on cutting fluids at the recent exposition in Cleveland. A valuable feature of this booklet is the introduction of material on the current theories of metal cutting based on the outstanding research work by Hans Ernst of Cin-

cinnati Milling. It's quite fittingly titled, "Modern Cutting Fluids." We can get it for you.

Silvery Alloy

A little technical treatise on "Silvery Mayari Alloy Iron," a natural nickel-chromium iron of high silicon content, has been released by Bethlehem Steel Co. Here is a succinct description of an important super-strength alloy iron for high-test machineable castings including large dies. Should be of more than passing interest to foundrymen, metallurgists and engineers.

Roof Pan

Several different car builders are using a steel roof pan to replace the fabric body top. This season, the pan is bolted to the body panels with insulated fastenings and insulation all around, thus making it possible to use the pan as the radio antenna. Quite an advantage in this development since the steel roof requires antenna mounting in awkward locations. This pan is practically as good-looking as an all-steel roof. Of course, next season some of these jobs may become all-steel.

Matched Sets

A series of nine tool steels forming a matched set which is said to solve any tool steel problem is described in a spiral-bound handbook just issued by Carpenter Steel. This booklet tells you how to select the proper tool grade by means of the "diagram" and then gives detailed specification data on each grade. Don't miss this booklet — it looks like an important contribution to the tool engineer.

—J. G.

MANUFACTURING
MANAGEMENT
METALLURGY

A Six With New Powerplant

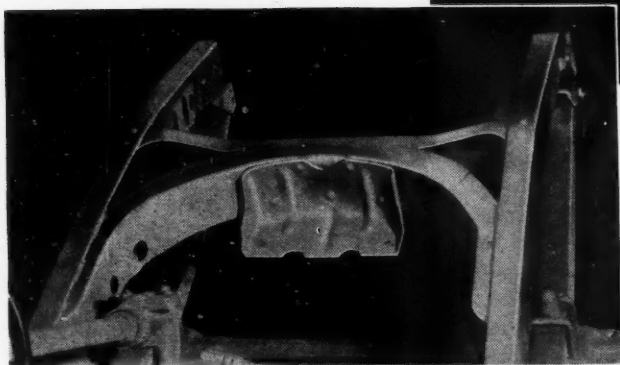
the New

by Joseph Geschelin
Detroit Technical Editor

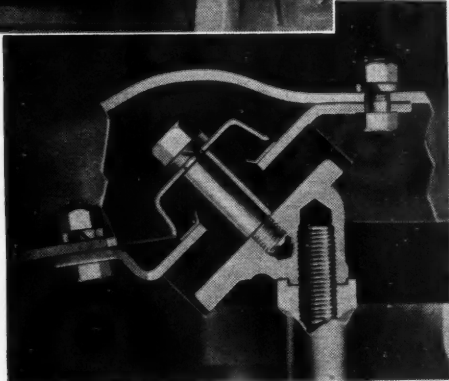
The chassis frames of the Dictator have a "keystone arch" construction as shown in the illustration below. Box sections extend from the cowl forward



Studebaker all-steel body stamping includes the windshield sections coming down to include the top of the cowl



This sectional view shows one of the live-rubber engine mountings



visors, arm rests, front and rear, and trunk lights, which are connected to tail lights and will turn on automatically when the luggage compartment is opened at night. Radio, with ear-level speaker, is available as an accessory. Free-wheeling, over-drive, automatic "hill-holder" and switch key starting are optional equipment.

The six-cylinder Dictator is powered by a new engine of 3¼-in. bore and 4¾-in. stroke, rated at 90 hp. at 3400 r.p.m. It has a cast-iron cylinder head and the compression ratio is 6.3 to 1. The design features new manifolding, automatic heat control, and lubricated, barrel-type valve lifters. Pistons are of aluminum and have a slotted skirt. The President engine remains unchanged (eight-cylinder, 31-16 by 4¼ in., 6.5 compression ratio, with aluminum pistons and cylinder head). However, it is now rated 115 hp. at 3600 r.p.m.

Radiators are deep, and slender. Front fenders curve low over the front wheels and blend into the radiator and body. Hoods are long, hood louvers are slim and contribute to the sweeping contours. The windshield is sloped and divided in the middle. Head lamps are of tear-drop design and the shape is repeated in the tail lamp. Trunks or luggage compartments are "built-in." Bumpers are 4½ in. wide, chromium plated, and styled to harmonize with the body design.

Among the automatic features are an automatic choke, a fast-idling carburetor, heat control, ride control and spark control. Equipment available

WITH an eye to simplification and greater economy in production, Studebaker is offering for 1936 a line consisting of only two groups of cars—a Dictator Six and a President Eight. The President is a deluxe line with unusual styling and luxury for the medium-price class. It was designed, decorated and trimmed under the direction of Miss Helen Dryden, a well-known New York stylist and artist. Both lines feature a number of options to meet the varying requirements of car buyers. Prices start with the base price of \$665 f.o.b. factory for the Dictator and \$965 for the President. The following body types will be offered:

Dictator

Four-door Sedan without trunk
Four-door Sedan with trunk
Four-door Sedan without trunk (six-wheel)
Four-door Sedan with trunk (6-wheel)
Two-door Sedan without trunk
Two-door Sedan with trunk
Coupe for three
Coupe for five

President

Four-door Sedan without trunk
Four-door Sedan with trunk
Two-door Sedan without trunk
Two-door Sedan with trunk
Coupe for three
Coupe for five

Dictator models also will be available with fifth wheel and metal tire cover mounted in the right fender well.

Equipment of President models includes two conch shell-type horns, two windshield cleaners, two swinging type

and An Eight Comprise Studebaker Offerings

on all models at extra cost includes automatic "hill holders," which prevent backing when the car is stalled facing an upgrade, a combination of overdrive, free wheeling and automatic starting on Presidents, cushioned engine mountings, and greatly improved steering. Hydraulic brakes are standard on all models. Most of the models carry five wheels, the spare wheel being carried either inside the trunk or luggage compartment or in the right fender well of Dictators. Six-wheel jobs are available in the Dictator. The new cars have all-steel tops the roof-to-rear-bottom panel being in a single stamping.

The "planar" individual front wheel suspension developed last season is standard on President models and available as an option on Dictators. Pressed-steel brackets replace the castings formerly used for mounting the tubular members. The rate of the front spring has been reduced from 250

Automatic Hill-Holder and Over-Drive Are Available Features

	DICTATOR	PRESIDENT
Wheelbase	116 in.	125 in.
Tread (front and rear)	57 $\frac{3}{8}$ —60 $\frac{3}{8}$	60 $\frac{3}{32}$ —61 $\frac{5}{16}$
Horsepower	90 at 3400	115 at 3600
Displacement	217.8 cu. in.	250 cu. in.
Bore and Stroke	3 $\frac{1}{4}$ x 4 $\frac{3}{8}$	3 $\frac{1}{16}$ x 4 $\frac{1}{4}$
Compression ratio	6.3 to 1	6.5 to 1
Cylinder head	Iron	Aluminum
Type pistons	Alum—3 ring-groove above— slot skirt	
Camshaft drive	Gear	Gear
Main bearings	4	9
Oil capacity	6 qts.	8 qts.
Gasoline tank	18 gal.	18 gal.
Tire sizes	6.00 x 16	6.50 x 16
Battery capacity	102 amp.-hrs.	102 amp. hrs.

Standard equipment not included in list price:

DICTATOR SIX: Extra tire and tube, metal spring covers, bumpers, arm rests, extra windshield cleaner and automatic hill holder.

PRESIDENT EIGHT: Safety glass, bumpers, extra tire and tube, spring covers, windshield cleaners, tail light, twin horns, phantom steering wheel, cigar lighter and sun visor.

The following items of equipment are also available:

DICTATOR SIX:

1. Phantom steering, twin horns, extra tail lamp, extra sun visor.
2. Startix, free wheeling and overdrive.
3. Studebaker exclusive planar suspension.
4. Mohair upholstery.

PRESIDENT EIGHT:

1. Overdrive, automatic switch key starting, free wheeling and automatic hill holder.
2. Mohair upholstery.



The President Sedan is powered by an eight cylinder engine of 115 horsepower. Its exterior and interior trim, fittings and upholstery were chosen and designed by Miss Helen Dryden

to 225 lb. per in. on the President and from 225 to 210 lb. on the Dictator. There are 13 leaves in the front spring of the Dictator and 15 in that of the President.

The stiffness of the Dictator frame has been increased considerably by the adoption of "keystone arch" construction at the front. In addition to box section side rails from the dash forward, braces have been added back of the front cross-member.

Houdaille two-way adjustable shock absorbers are used on the Dictator; Houdaille two-way shock absorbers with automatic ride control on Presidents.

Roller bearings take the thrust in the steering knuckles of all models, and a cushioned drag link has been adopted. Cross steering is used on the conventionally-sprung Dictators. The gear shift lever has been moved forward 3-in. All transmission gears are helical, including the reverse gears. Standard gear ratios are 4.55 to 1 on Dictator models, 4.55 to 1 on the President when the conventional transmission is used, and 4.7 to 1 on the President with overdrive transmission.

The Dictator engine has been moved forward 41-8 in. and rear seat passengers now ride ahead of the rear axle. In the Dictator the weight is equally divided between front and rear axles.

Disc wheels are used on the President, steel-spoke wheels on the Dictator. Both are of 16 in. diameter and carry large hub caps.

The new Dictator engine has a counterweighted crankshaft. Main and camshaft bearings are steel backed, babbitt lined. Connecting rods are of alloy steel with spun babbitt bearings. The cylinder block is of gray iron with mirror-finish, honed walls. Camshaft drive is by helical non-metallic gear.

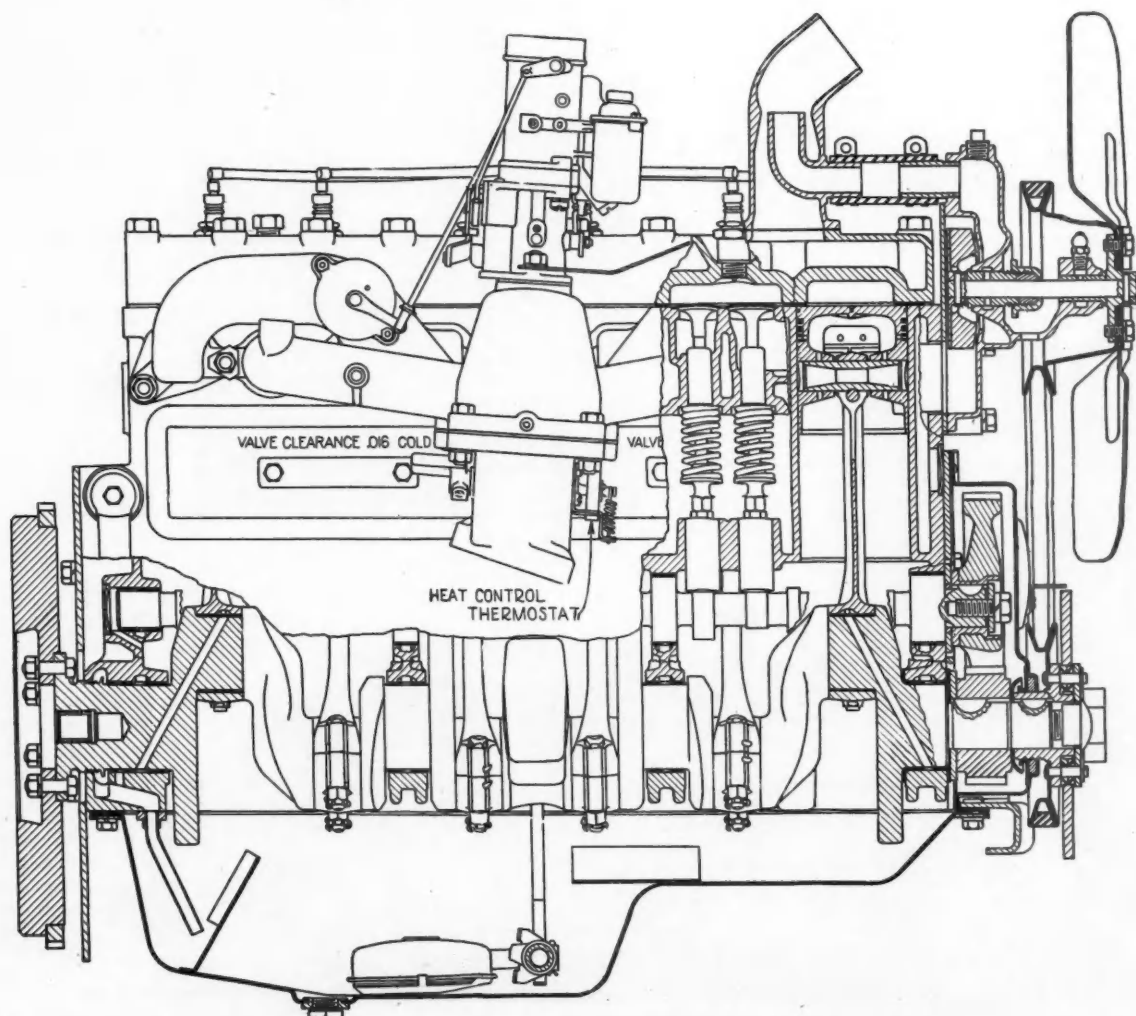
Pistons are of aluminum, with slotted skirts, cam ground. The top (ring) groove is left empty and the land above it is ground 0.025 in. undersize.

Branches of the intake manifold on the Dictator slope upwardly, for better drainage. Baffle plates in the crankcase keep a supply of oil around the pump at all times. Cast, barrel-type valve lifters are used. They are pressure-lubricated and can be readily removed from the side when necessary.

To give the effect of zero clearance at low speeds, a positive "grasshopper" bent flat spring is fitted between the lower end of the valve stem and the top of the lifter.

On the Dictator, automatic heat control is effected by an offset butterfly valve in the opening in the passage from the exhaust manifold, surrounding the intake manifold directly under the carburetor. Under normal operating conditions, with the engine warm, the pressure of the exhaust-gas stream keeps the valve in the closed position. This pressure is opposed by the spring pressure of the thermostat, which is attached directly to the valve shaft. When the engine is warm, this spring pressure is reduced, but when the engine is cold it holds the valve open against the impact of the exhaust gases.

A large rubber mounting is used at the front of the engine and two more are set at a 45 deg. angle just back of the clutch housing on Dictator models. On over-drive-equipped Presidents there is a fourth mounting back of the transmission. Clutch and brake pedals now are mounted on the frame.



Longitudinal section of Dictator 6-cylinder 3 1/4 by 4 3/8 in. engine

There are two bends in the exhaust passage through the muffler, which is otherwise of the "straight through" type.

For protection against vapor lock the fuel line is carried along the outside of the frame on the side opposite to the exhaust, and around the front of the engine to the fuel pump. Fuel pump and carburetor are shielded from engine heat. The carburetor float chamber is protected with a shield.

A thermostat is located in the upper radiator hose on all models. On the Dictator the cooling water is discharged in jets against the valve pockets and cylinder heads. Full-length jacketing around the cylinders also contributes to better cooling. All radiators are of the flat-tube-and-fin type, and all are sloped.

High-output generators with increased charging rates are used on President models and on radio-equipped Dictators, with a relay regulator to prevent overcharging. Batteries on all models are of 102 a.-h. capacity. Cranking speeds have been increased by a change in the starter gear ratio.

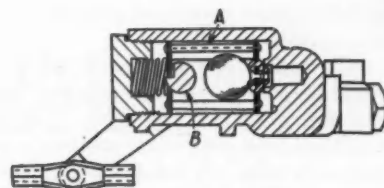
The hydraulic service brakes are

designed to give 55 per cent braking on front wheels and 45 per cent on rear wheels. The parking brake operates on the shoes of the two rear wheel brakes, mechanically through cables to each assembly.

A rather novel feature available on Studebaker cars this year is the automatic hill holder which prevents backing on an incline. While this is a revival of devices used in the past, in reality it incorporates a different principle, since it acts directly on the braking system.

The hill holder comprises a small external check valve at the master cylinder of the braking system, directly connected to the clutch. Whenever the car is on an up grade, if the brake pedal is depressed to brake the car, depressing the clutch pedal will close the valve and prevent release of pressure in the hydraulic system. Under these conditions, so long as the clutch pedal is held down, the foot can be taken off the brake pedal without releasing the brake shoes. Brakes stay on until the clutch pedal is released.

A cross-sectional view of the check valve is shown herewith. The cage A



Check valve of "hill holder"

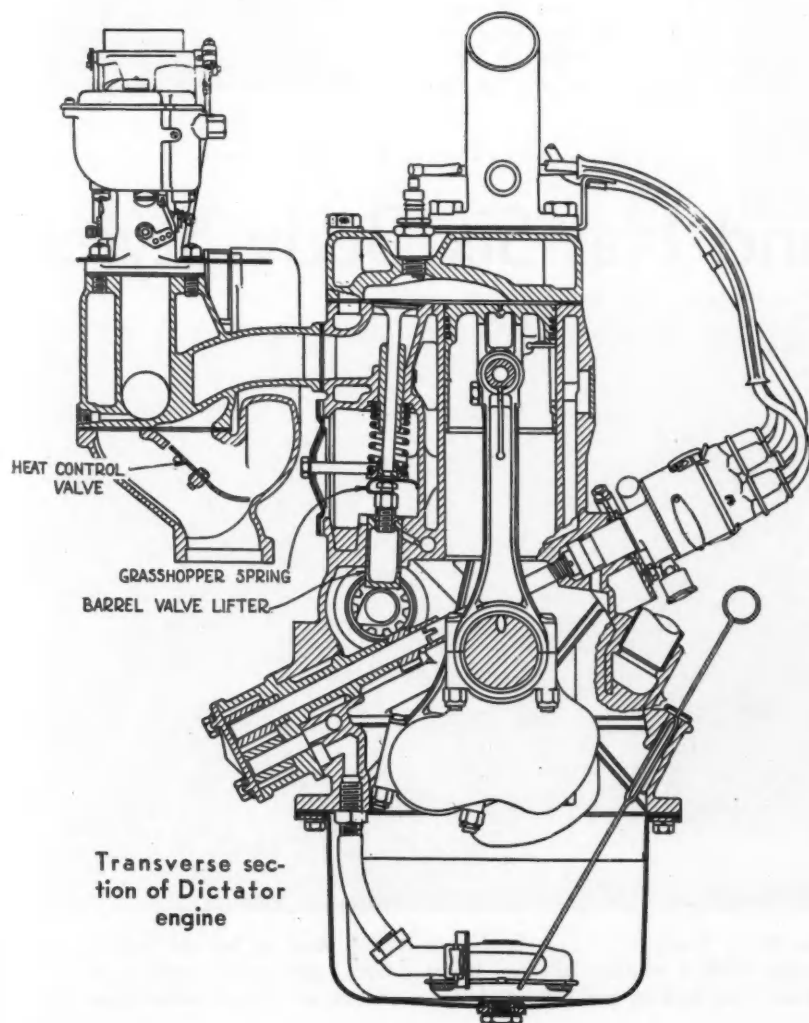
contains a large steel ball which closes the orifice communicating with a passageway to the master cylinder when the assembly is tilted upward. The drawing shows events when the clutch pedal is depressed. The passageway is closed and the brake hydraulic system is held under pressure. Release of the clutch pedal turns shaft B, moves the cage forward, and opens the fluid passage.

The entire line features new all-steel bodies with a solid steel roof formed by a stamping that starts at the back panel, and includes the rear window, the entire top, windshield opening, and the top cowl panel.

The overall roof height is 67 in. in the Dictator and 67 13/16 in. in the President. All models are roomier than last year. Front seats measure 53 1/2 in., rear seats, 53 in. Sedan doors are hung on extra-heavy, silent hinges and are swung from front and rear positions, both closing at the center pillar. Front-door openings measure 32 1/2 in. wide in sedans, 39 in. in coupes and 41 in. in the St. Regis model.

All body panels are sprayed with Insulmat, an asphaltum heat-insulating compound. Roof panels are sprayed to a thickness of 5/32 in., the insulation being baked at 240 deg. F. This is covered with a layer of "Kimsult," which absorbs sound. Before compression, this material is about 8 in. thick, and it is "punch compressed" to a thickness of 3/4 in. It is an asphalt-treated, laminated cellulose wadding weighing 2 lb. per cu. ft. and is backed with 25-lb. double-creped asphalt-impregnated paper, the heat and pressure joining the two.

Floor boards are raised clear of the frame in the front compartment and rest on rubber tubes of rectangular section. The dash is insulated with a corrugated fibrous structure and two cellular layers laid on Silento, which is sprayed on the dash first. On top of this is a layer of Kimsult and over this a garnishing cover. The floor mat of the front compartment is of rubber, 3/4 in. thick and beneath it is a 7/16-in. fiber insulation. The tonneau and rear-compartment steel floors are insulated with a heavy coat of Insulmat, Silento being laid on the upper side, and carpet laid on top of the Silento. Pedals, steering



column, brake lever and gearshift lever are sealed.

All models are furnished with generous luggage compartments and space for the spare tire and tools. Two-door and four-door sedans are available with built-in trunks. On the President models a trunk light comes on automatically when car lights are turned on and the rear deck door is raised.

Dictators are upholstered in broadcloth or mohair. Seats are form-fitting and unusually deep. Foot rests for rear-seat passengers are built into the backs of front seats. Front seats in sedans are adjustable, with a "run" of 4 in.

Ceilings are treated with a "dome" effect. Carpets are used in rear compartments, thick rubber mats in front compartments.

Dictator instrument boards are entirely new, designed in "fan-shape" style. Hardware is new in design and is chromium-plated.

President interiors are the result of Miss Dryden's efforts. There are also several distinct evidences of her art on the outside. One is the distinctive medallion on the radiator, another the radiator ornament. The most striking interior ornamentation is found on the instrument panel. Three raised chro-

mium bands run horizontally across the entire instrument board. The speedometer, large and indirectly illuminated, and its "family" of instruments (ammeter, electric gasoline gage, oil-pressure indicator and engine-heat indicator) are at the left. In the center of the instrument panel are the windshield regulator crank, four control knobs, and an ash receiver. Rear compartments of President sedans have carpets insulated with sponge rubber on the floors. Steering wheels of President models are of anti-fatigue Phantom type, with three spokes and 18 in. in diameter.

Chevrolet Adopts Hydraulic Brakes

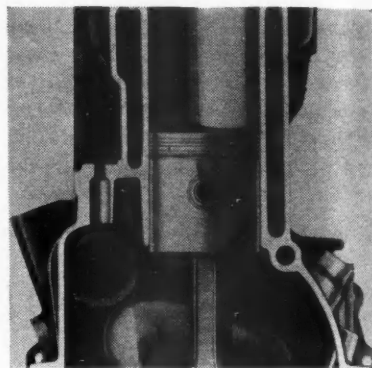
(Continued from page 581)

The outer surface of the drum has five deep grooves cut in it to promote cooling. The Standard is fitted with pressed steel drums 1 in. larger in diameter than last year's, increasing the brake lining area to 158¼ sq. in. Dirt shields have been added.

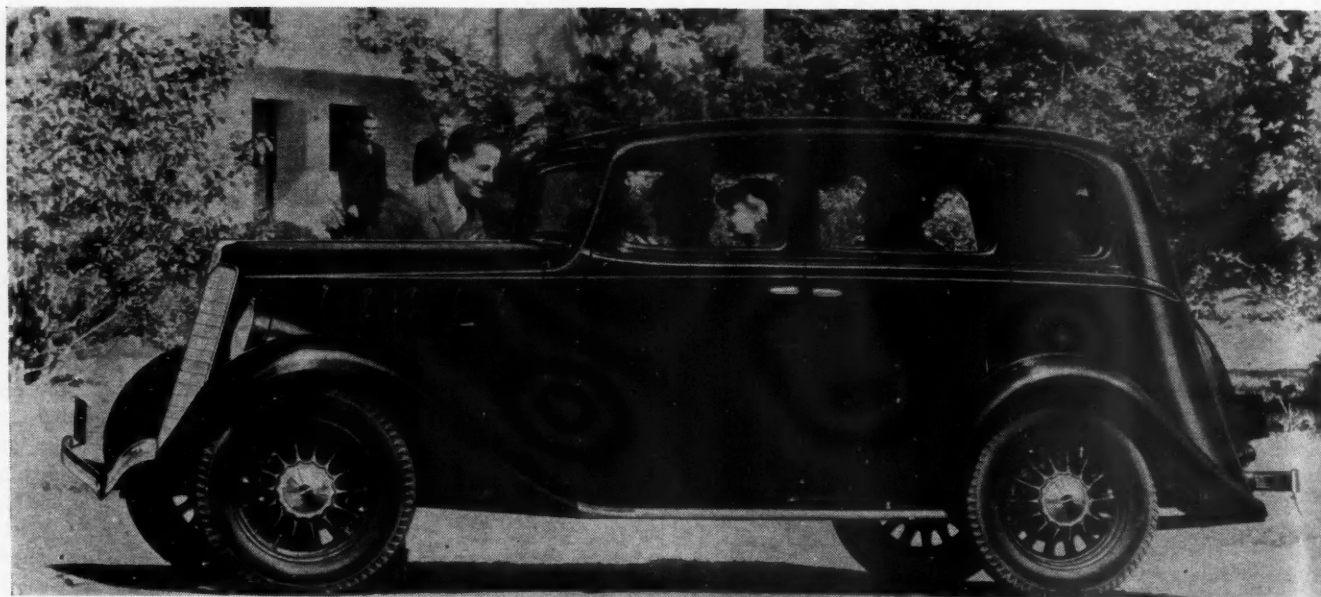
All-enclosed knee action units, now entering their third year of service, remain unchanged except for an improvement in the method of fastening the wheel spindle to the support arm. The spindle is now pressed into the arm under 10,000 lb. pressure, and its inner end is then peened over.

Cylinders have "full-length" water cooling of the new Chevrolets

Riding qualities of the Standard have been improved by an entirely new design of springs and suspension. Front springs are 36 in. long and the rate is reduced to 209 lb. per in. Rear springs are 49 in. long, and their rate is increased to 112 lb. per in. The front-spring shackles are now at the rear ends.



Willys-Overland Has Six Body Styles



Willys-Overland presents its 1936 line in six body styles—a four-door sedan and a two-passenger coupe in either standard or deluxe type, with a choice of five body colors, and two commercial units, a panel delivery and a cab pick-up. All bodies are mounted on a chassis of 100-in. wheelbase

Four Six-Cylinder Models Make Up the Reo Line for 1936

REO MOTOR CAR CO. has joined the ranks of the several car builders who have simplified their lines for 1936. Reo offers just one line—a six-cylinder Flying Cloud mounted on a chassis of 115-in. wheelbase. It is available in four body models—a four-door deluxe sedan, a four-door standard sedan, a deluxe brougham and a two-door coach. The base price at the factory is \$795 for the coach and up to \$895 for the deluxe sedan.

Main features of the engine are continued without change. It is a 6-cyl., L-head, 3 $\frac{3}{8}$ by 4 $\frac{1}{4}$ -in. engine of 228 cu. in. displacement, rated at 90 hp. at 3400 r.p.m., with aluminum head. It is flexibly mounted on four cushion rubber supports.

Numerous body refinements characterize the new models, notable among these being a steel roof panel which is fully insulated for protection against heat, cold, and noise, and can easily be replaced in case of accident. The panel, moreover, can be used as a radio antenna and is fitted with a lead wire for this purpose.

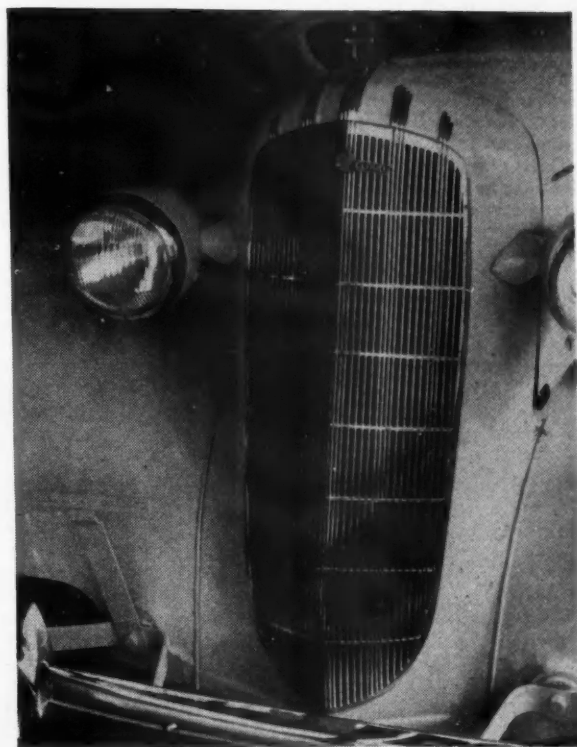
The front end of the car is set off with Zeppelin-type front fender lamps, which follow out the smooth flowing design of the headlights and radiator ornament. The overall height of body has been decreased.

This year, the transmission is of the synchronized type, with all helical gears for silent operation. The gear shift lever is set forward and the hand brake moved to the left hand side to accommodate three people in the front seat.

Five demountable, pressed - steel wheels, equipped with 6.25 by 16 tires, are standard. The spare wheel is carried in the rear compartment. Front and rear springs are of silico-manganese steel, with metal covers. Safety glass is specified for the windshield. Chrome disks for five wheels, electric clock, and radio are available at extra cost.

The frame is of all-welded construction of the double-drop type and with a central X-brace which is extended to form box-shaped members for the

Radiator grille of the new Flying Clouds. The use of chromium is one of the features of the new Reos



The 1936 Flying Cloud interior—Upholstery is treebark tone. There are two ash trays in the rear

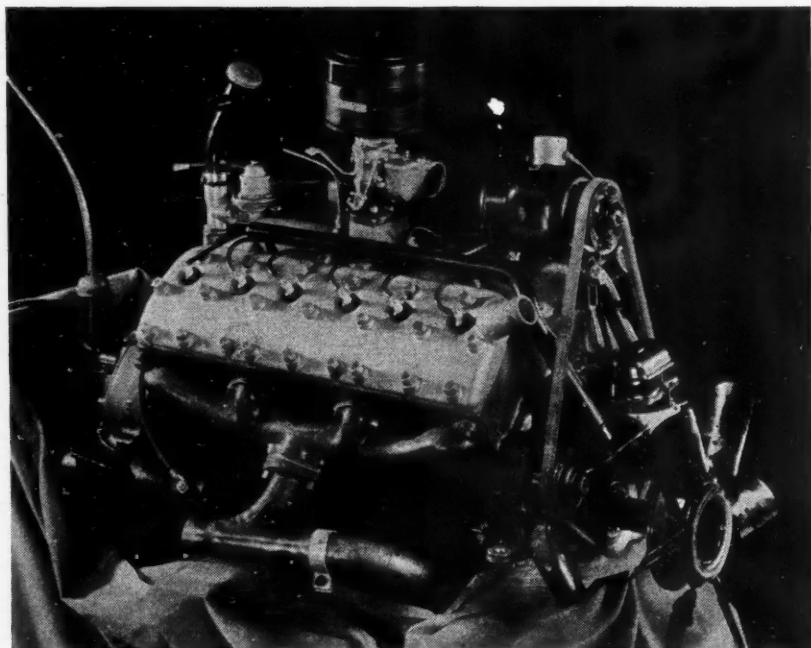
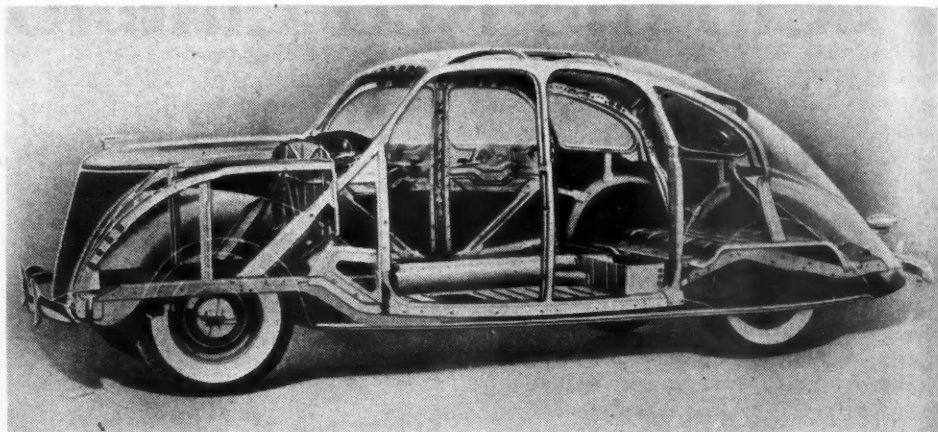
length of the powerplant section. The welded construction serves to impart greater strength and stiffness. Reo continues the use of a hard chrome-nickel iron block with high speed tool steel exhaust valve seat inserts; and Lo-Ex aluminum alloy pistons, with T-slots and cam-ground skirt. Improved manifolding is a feature, combining the use of an exhaust-jacketed

intake manifold with thermostatic heat control. A down-draft carburetor is used, with a combined air cleaner and intake silencer. Spark advance is vacuum controlled. Metric (18 mm.) spark plugs are standard. Starting is effected by means of the clutch pedal. The battery is 102 amp.-hrs. capacity.

Bodies are of steel construction
(Turn to page 608, please)

New Lincoln-Zephyr a V-12

Phantom drawing showing Lincoln-Zephyr all-steel body construction. The entire body structure takes the place of the conventional chassis frame. The various parts are welded into an integral unit, including the underbody assembly and floor. The steel top, side and rear panels and cowl also are welded to the body framework. The engine block is a one-piece casting comprising both cylinder banks, the crankcase, and flywheel housing



FORD makes a bid for a new market with the Lincoln-Zephyr, an entirely new car with a V-12 engine and a distinctive body with steel roof and a truss construction which eliminates the usual chassis frame. It will be initially available in two body models, a two-door and a four-door sedan. Owing to the frameless design, the floor height is only 14 in. and the overall height 69 in. The wheelbase is 122 in., the front tread 55½ in., and the rear tread 58¼ in.

Curb weight of the four-door sedan is 3600 lb., and this weight is equally divided between the front and rear wheels. Road speeds up to 90 m.p.h. are available in stock models.

The V-12 engine is a development of

the Ford V-8 design, with necessary detail changes. It has a bore of 2¾ in., a stroke of 3¾ in. (267.3 cu. in. displacement), and is rated 110 hp. at 3800 r.p.m. Cylinder heads are of aluminum and the compression pressure is 145 lb. per sq. in., maximum. The angle between cylinder banks is 75 deg.

The engine block is a one-piece casting comprising both cylinder banks, the crankcase, the exhaust passages, and the flywheel housing. A duel downdraft carburetor is mounted on an aluminum casting forming the manifold and valve chamber cover. The valve arrangement is similar in principle to that developed for the Ford V-8. A

three-point mounting is used, there being two rubber mountings at the front, one at the rear.

Crankshafts are cast of the same alloy as that used for the V-8. Connecting rods are mounted in pairs side by side on sleeve-type bearing inserts of steel surfaced with a special anti-friction material.

The pistons are of a special steel alloy with high copper content, with extremely thin walls and thin crown. They weigh only 11½ oz., or about 1½ oz. more than aluminum pistons of the same size. Three narrow rings are used. In production, the pistons are finished by centerless grinding.

It is claimed that all ordinary maintenance operations on the engine can be handled from the top when the hinged lid of the engine compartment is lifted. The fan is mounted low, being driven off the end of the crankshaft. Water pumps are located at the bottom of the block.

Wheel suspension follows characteristic Ford lines, being by transverse springs at front and rear, with radius rods to both axles. Springs are metal-covered. This type of suspension results in very low unsprung weight and thereby contributes to the riding quality. The rear radius rods act within a recess in the steel underbody, and the torque tube extends through a deep tunnel in the underbody, with the universal joint located directly over a cross-member at the rear of the transmission.

The transmission is a three-speed unit with all-helical gears, with a synchronizer between second and high. The clutch is semi-centrifugal, with a 10-in. driving plate. The hand-brake is lo-

2 on 122-Inch Wheelbase

cated on the left side under the instrument board. It applies the brakes by a pull-up action through a cable. Service brakes are of the mechanical, two-shoe type, with cable control. Drums are of alloy cast iron, 12 in. in diameter, with cooling fins on the outside.

The muffler is mounted transversely at the rear, behind the gas tank. The exhaust line is anchored to the frame underbody with rubber-insulated brackets and has a flexible connection to the engine.

The body is of all-steel construction, with a steel roof that extends from the tire-compartment door at the rear, over the top to include the windshield header. The body measures 69 in. in width at the widest section, giving plenty of room for six adult passengers. It is unique in that it incorporates a truss design which eliminates the customary chassis frame. The body structure comprises the steel panels, steel roof, steel underbody, and steel sills to which all chassis gear is fastened.

Another innovation in body construction is the fact that body panels are welded rather than bolted to the sills, making the whole structure really an integral one-piece unit.

Body side panels run the entire length of the structure, including the sides of the engine space, which now are integral with the body. The hood is hinged at the cowl and is lifted by means of the radiator ornament. The water filler spout is at the front over the radiator, the oil filler is located at the cowl.

The body is so designed that the

panels take a definite skin loading and contribute to the strength and stiffness of the whole. The main loads are taken almost equally between the top and the underbody. Truss members to take the body loads start at diagonals at the front, continue into the roof rails, and extend into diagonal members at the rear deck. Roof bows are of steel.

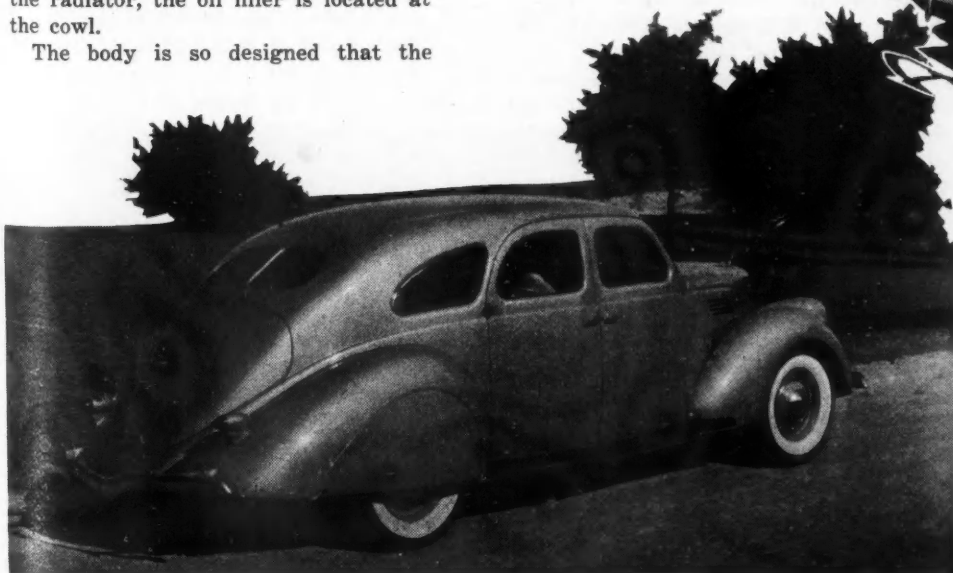
The rear compartment is made in two sections. The outside has space for housing the spare wheel, which is

mounted directly on the rear diagonal bracing member; the inside compartment, accessible from the body interior, is for baggage.

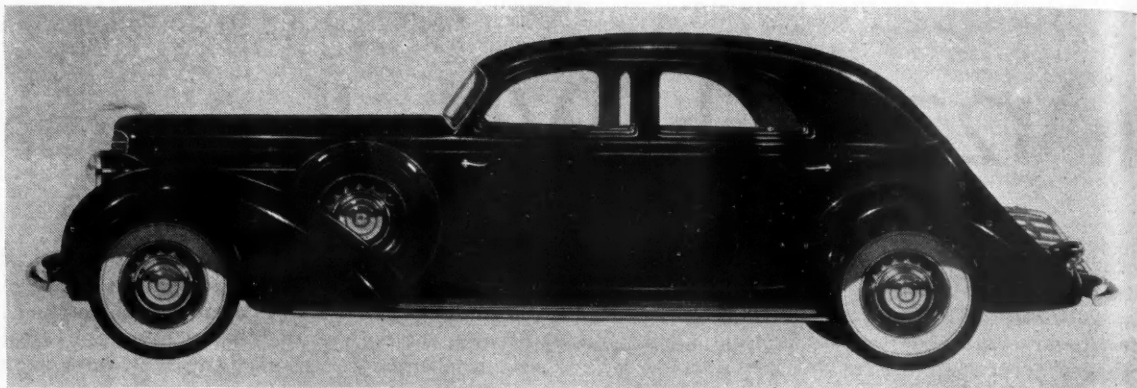
Other features of the body include very narrow running boards, only wide enough to protect the fenders and body panels, which are finished with a steel buffer band; soft cushions with individually pocketed upholstery springs, and seat frames of formed chromium-plated steel tubing. Headlamps are



This body is provided with a most unique arrangement for radio antenna, utilizing the rear compartment door for this purpose



Three views of the new V-12 Lincoln-Zephyr, product of the combined Ford and Lincoln organizations. This newest entry in the medium-price field is illustrated by this four-door sedan type. It has no orthodox chassis or chassis frame. The car comprises a "bridge truss" body in which the engine is mounted and to which the running gear is attached. The 12-cylinder engine develops 110 horsepower. Wheelbase is 122 inches, springbase 133 inches



Sport sedan by Willoughby on the 150 horsepower Lincoln V-12 for 1936. Built into the back of the front seat are three cabinets. The door of the largest of these cabinets, in the center, folds upward to form a table

A glimpse of the driver compartment of the new V-12 Lincoln-Zephyr. The car accommodates three adults in both the front and the rear seats

recessed in the front fenders. The rear fender opening is fitted with a metal cover. Doors are latched at the center pillar. A formed drip molding is fitted over the door openings.

Insulation against heat and sound has been carefully worked out. The underbody, door panels and all body panels, including the roof and baggage compartments, are covered with a heavy coating of sprayed plastic deadener. In addition, the roof panel takes a thick coating of padding, while body panels are coated with a waffle paper insulating material over the sprayed deadener.

Stamped steel wheels are standard and are fitted with 7.00-16 tires. The final-drive ratio is 4.33 to 1; the steering gear ratio, 18 to 1.

IMPROVEMENTS in the 150-hp. Lincoln for 1936 comprise detail changes intended to enhance the beauty and mechanical excellence of these luxurious vehicles. Eighteen body styles are being offered, most of them by custom builders. Four leading coach-building firms have cooperated with Lincoln in evolving the 18 body types available, which are as follows:

By Lincoln—Seven-passenger sedan, seven-passenger limousine, seven-passenger

senger touring, five-passenger three-window sedan, five-passenger two-window sedan, five-passenger coupe.

By Brunn—Brougham, cabriolet (non-collapsible and semi-collapsible types), convertible victoria.

By Judkins—Two-window berline, three-window berline, sedan-limousine.

By LeBaron—Convertible sedan, convertible sedan-phaeton, convertible roadster, two-passenger coupe.

By Willoughby—Limousine, sport sedan, panel brougham.

Radiator shell and grille are similar to the corresponding parts of the 1935 Lincoln, but they are wider at the bottom. The front end as a whole is more massive. Fenders have bolder, more sweeping lines, and new dust shields are designed to harmonize with them. The inclination of the windshield has been increased from 20 to 27 deg., and the windshield glass has been carried 1½ in. higher, to improve the forward vision. The windshield header is more rounded and the top corners of the windshield also are more rounded. Running-boards are straight instead of curved. Rear fenders carry through the streamlining effect of the front fenders.

The hand-brake lever is now located

at the left of the driver beneath the dash.

An improved clock is a part of the elaborately equipped instrument panel, which also mounts a 110-mile speedometer with total and trip mileage indicators; fuel, temperature and oil gages, and ammeter located around the edge of the clock dial; starter, choke, throttle and power brake control buttons; electric cigar lighter, ash tray, windshield ventilation regulator and glove compartment with lock.

The custom builders also present smart new detail style changes. Brunn shows a new victoria convertible coupe, decidedly continental in its conception, in which the European waistline, down-sweeping from front to rear, is emphasized. The Willoughby sport sedan reveals a swanky sloping windshield, giving the roof lines a smart sweep. Judkins provides for concealing the auxiliary seats in his sedan-limousine.

Among the mechanical improvements are changes in the transmission, wheels and steering. Quiet helical gears are now used in first speed and reverse, as well as in second and high. Wheels are new, of one-piece welded-steel construction, and have larger hub caps.

The steering has been improved by the installation of a radius rod (with ball and socket joints) between the front axle and the frame side rail on the left side. This prevents axle motion from interfering with steering-gear action. The left front spring is now shackled at both ends. The steering-gear ratio has been increased to lessen the effort required in steering.

All bodies are mounted on the chassis of 145-in. wheelbase, except the more close-coupled—the five-passenger sedans, the five and two-passenger coupes, and some of the convertible types, which are mounted on a 136-in. chassis.

New Type Bodies, Two Chassis Sizes for 1936 Hupps

HUPP MOTOR CAR CORP. offers improved versions of its six- and eight-cylinder aerodynamic lines for 1936. Particular attention has been paid to styling, exteriors being the work of Raymond Loewy, while the interiors are by Adolph Lichter, who only recently moved to Detroit from Paris. As may be seen from the illustration herewith, there is no offset in the sides of the bodies, and the rears are decidedly streamlined.

The new bodies are mounted on two chassis, one of 118-in. wheelbase with a six-cylinder 101-hp. engine, the other of 121-in. wheelbase with a 120-hp. eight-cylinder engine. Bodies include two types of sedans, a two-door and a four-door, with and without trunk, and a rumble-seat coupe; also a business coupe on the Series 618. Each of these body types come with standard and deluxe equipment.

The windshield is much wider than normal and has been brought back close to the steering wheel, giving the driver a much greater range of vision vertically. On the eight-cylinder cars the front of the windshield has been bevelled, thus bringing the front pillars further back. This increases the horizontal angle of vision decidedly. With the upper edge of the windshield

close to the driver's eye, it is possible to look upward at a much sharper angle and in this way eliminate difficulties in observing traffic lights, etc.

By the use of wide doors and wide windows, the rear quarter window has been rendered unnecessary, thus reducing the number of pillars. There are two wide windows in back of the car, which give the driver a much better rear vision. In fact, the entire road behind the car is visible from the driver's seat.

The body is of all-steel construction. The only wood parts used are the floor boards, roof rails and ribs, and a few trim sticks. Thus the passengers are protected in all directions by a rigid steel structure. Because of the greater width in the front of the car, three passengers are readily accommodated. The front seat is adjustable 4 in. fore-and-aft.

The entire body has been moved forward relative to the rear wheels, thus bringing the rear seat entirely ahead of the rear axle and the rear floor board down to the top of the chassis frame, giving a car of low built with ample head room. Both front and rear doors on the sedan are hinged to the center pillars.

Among other features of the new

Hupmobile bodies are a wider dash, a larger package compartment in the dash and—because of the streamlined shape of the rear—an unusually spacious luggage compartment at the rear of the car, with space also for the spare tire and tools.

A new ventilating system has been evolved for these cars. The front of the dash is cut away at both lower outer corners, forming a large passageway between the fenders and body for the hot air to escape beneath the hood. In addition, the dash is heavily insulated on the rear side to keep engine heat out of the body.

The most conspicuous front-end change consists in the adoption of a
(Turn to page 607, please)

The New Prices

618-G Special-6

Sedan, 2-door	\$815
Tour. Sedan, 2-door	850
Sedan, 4-door	855
Tour. Sedan, 4-door	890
Bus. Coupe	795
Coupe with rumble seat..	840

Custom-6

Sedan, 2-door	890
Tour. Sedan, 2-door	925
Sedan, 4-door	930
Tour. Sedan, 4-door	965
Bus. Coupe	870
Coupe with rumble seat....	915

621-N Special-8

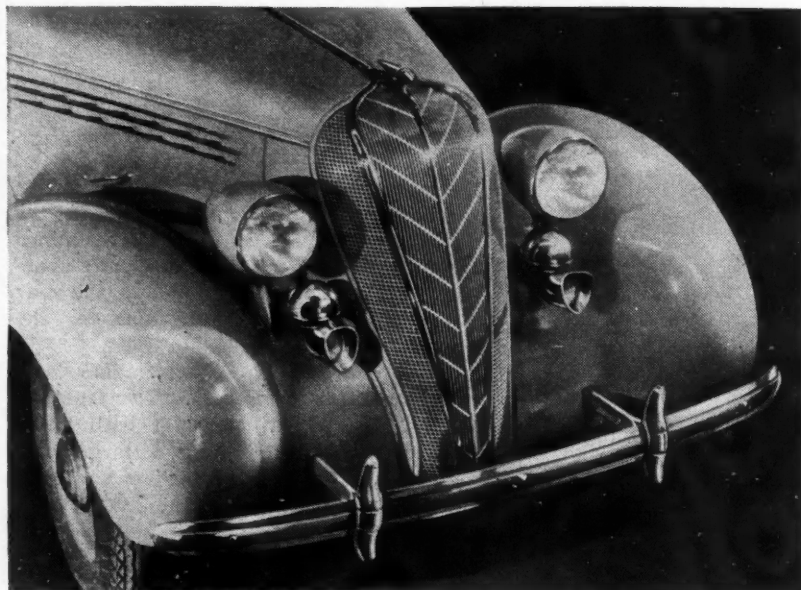
Sedan, 2-door	995
Tour. Sedan, 2-door	1,035
Sedan, 4-door	1,035
Tour. Sedan, 4-door	1,075
Coupe with rumble seat..	1,035

Custom-8

Sedan, 2-door	1,095
Tour. Sedan, 2-door	1,145
Sedan, 4-door	1,135
Tour. Sedan, 4-door	1,175
Coupe with rumble seat....	1,135



Hupmobile Six,
Four-Door Sedan—
101 H.P.—118 in.
wheelbase. There
are twelve body
styles; Prices F.O.B.
Factory \$795 and
up, special equip-
ment extra



New Terraplane front end for 1936 showing the single handled hood clamp, the chrome-plated grille and the location of the twin horns

available. The tire size is 6.00 by 16 in. and the brake drum diameter is now 10 1/16 in.

Chassis changes and developments include "radial safety control," a new front-end suspension system, duo-automatic hydraulic brakes, an automatic draft eliminator; roomier all-steel bodies with a one-piece steel roof and improved heat and sound insulation, and softer springs.

Front seats in the sedan body are 50 in. wide; rear seats, 49 in. At shoulder and elbow height the width is 56 in. above the arm rest, and there is also more leg room.

A one-piece steel top has taken the place of the flanged-type employed in last year's car. It is built in Hudson's own body shop, in which new equipment was added to produce the 1936 body. For sound insulation, muffle-board, a fibrous material, is cemented against the inner roof of closed bodies. Strips of Masonite are placed loosely side by side beneath the muffle-board, and soft blue wadding is placed between the Masonite and the top bows. The blue wadding, as well as the Masonite, is loose. Beneath the top bows is an interlining for the body which does not function as a silencer, but simply as an interior trim. It further filters air entering the body through the filter cloth.

Muffle-board is also cemented against the flat door panels and against other flat surfaces throughout the body. To insulate against engine sounds, as well

The New Wheelbase

as fumes, a system of sound deadening is employed at the front of the body. Cowl panels are covered with kersey cloth about 3/4 in. thick. Behind this kersey pad is the wiring of the car, over which is placed another 1/2 inch of kersey and then 3/8 in. corrugated board. Over the corrugated board is the dash-finish panel of embossed laminated board.

The body floor has a 1/4-in. kersey cloth covering, over which the carpet is placed, cemented to the floor; while under the rear deck a sound-deadening material, known as muffle-matting, prevents any rumble at this point. As a still further precaution, every joint and seam has a coating of rubber-air-sealing compound.

The ventilating system filters the incoming air supply, permitting air to enter the car only at a definite point when the ventilating system is in use. As the air is withdrawn from the car by vacuum, fresh air is drawn in through the "draft eliminator," comprised of a screening cloth similar to that used for vacuum cleaner bags. This screen is placed over an opening located at a point of adequate pressure outside the body—in the body floor just above the rear axle.

One of the most important innovations is what is known as "radial safety control." This refers to the fact that the front axle is guided in its up-and-down motion by two drop-forged torque rods, one on each side, pivoted to the frame side-rail. A vertical pivot pin at the front end of the torque rods, located in the front axle, and a rubber-bushed pivot bearing on the side-rail at the rear end, permit slight transverse movement of the front axle under thrust from the wheel. The rubber bushings in the pivot bearings at the rear ends of the torque rods insulate the frame and body from road shock. These torque rods permit the use of softer front springs, shackled at both ends and mounted on the axle by means of a lubricated saddle bearing which fits around a cylindrical machined portion of the front axle. It is claimed that with this front suspension system it is

A TERRAPLANE SIX combining roominess and bigness with modern body lines and equipment, priced in the lowest bracket, is offered by the Hudson Motor Car Co. for 1936.

Two series of body styles are available—de luxe sedan, coupe, coach, and convertible; also a custom line comprising the custom sedan, custom coupe, custom coach, and custom convertible. "electric-hand" shifting, with or without vacuum clutch, and built-in radio are optional.

The line is mounted on a chassis of 115-in. wheelbase—3 in. longer than last year. The six-cylinder 3 by 5 in. engine is rated at 88 hp. at 3800 r.p.m. with the standard compression ratio of 6 to 1, and at 100 hp. at 3800 r.p.m. with the "super-dome" aluminum head giving a 7 to 1 compression ratio.

The tread at the rear has been increased from 56 to 57 1/2 in. The standard rear axle ratio is 4 1/9 to 1; optional ratios of 3 8/9 and 4 5/9 to 1 are

w Terraplanes Have Longer e and Front Axle Torque Arm

no longer necessary to make compromises in laying out the steering linkage.

In addition to the master leaf, the second leaf also is wrapped to form the spring eyes, which increases the factor of safety.

Another safety feature is the use of duo-automatic hydraulic brakes. With this system, every emergency application of the hydraulic brake is backed up by a mechanical application which follows closely behind it, but which is inoperative unless something should cause the hydraulic brake to fail. The initial movement of the brake pedal applies the hydraulic brake. After the pedal has traveled a short distance, it picks up a link which is connected with the same mechanical brake system that is used for the emergency brake. This mechanical brake acts on the two rear wheels.

A number of improvements have been made in the engine. The water pump is now of the pressure type instead of the suction type. One of the reasons for this change is that the new pump gives a more effective flow to the car heater when installed. The pump shaft is surrounded by a spring-loaded graphite-impregnated cork washer. A stainless-steel washer and coil spring back up the cork washer with a second

stainless-steel washer which acts as the spring retainer.

The Carter carburetor has been improved and is now fitted with an anti-percolating device designed to prevent vapor lock in the float bowl. A spring-loaded needle valve in the float bowl opens when the throttle is closed, permitting any vapor to escape. With the downdraft type of carburetor, in hot climates, and particularly in high altitude, difficulty is often experienced in re-starting the engine after a stop. The anti-percolating device removes the cause of this difficulty.

Valve stems have been increased in diameter from 5/16 to 3/8 in. The vacuum cylinder of the optional automatic clutch has been increased in length, to increase the travel of the release mechanism and improve the gear shifting. The "electric hand" installation also has been improved in detail.

A number of changes have been made in the transmission. There is a dual interlock which requires depression of the clutch pedal to release it, thus preventing gears from slipping out of mesh. Gears have greater face width, and the transmission case is longer. The tooth chamfer has been changed to give better engagement.

Improvements in the headlamp have increased the candle power of the passing beam from approximately 25,000 to more than 50,000. This beam is deflected at a 3-deg. angle, to illuminate not only the road shoulder, but also the ditch. The driving beam candle-power remains at approximately 50,000.

Body interiors have been beautified in many respects. Because of the new V-form of the windshield, it is possible to tilt and curve the instrument panel. Instruments have been rearranged; in place of the water level gage, a water-temperature indicator is now supplied.

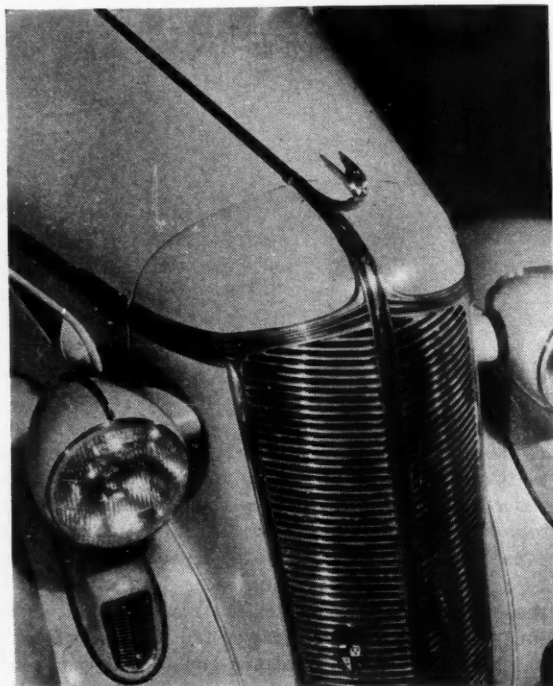
On the interior trim the seat cloth may be either worsted with a two-tone tree-bark pattern, or a 100 per cent two-tone red-brown mohair. For side walls worsted and mohair are optional, the headlining being colored to match.

The Terraplane Sedan is wider this year and has full three-passenger width in both the front and rear seats



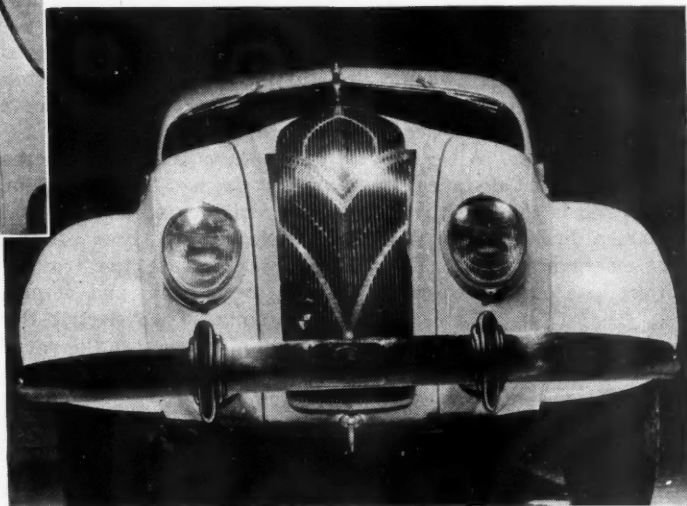
DeSoto Enters 1936

Airstream



The new die cast radiator grille of the Airstream DeSoto

New front of the Airflow models



DE SOTO offers the Airflow III for 1936 as a restyled and refined successor to last year's model. This line is mounted on a chassis of 115½-in. wheelbase and will be available in two body styles, a sedan and a coupe. A new die-cast radiator grille fashioned to produce a trellis-like arrangement of bright chromium plated vertical bars imparts a new frontal appearance to the car. Hood louvers also are new, consisting of three wing-shaped sections graduated downward and rearward.

The exterior has been dressed up by the introduction of an inset steel top which serves not only as a part of the decorative scheme but also as the antenna for car radio. It is acoustically treated and electrically insulated.

The engine is an L-head, six-cylinder of 3⅞-in. bore and 4½-in. stroke; it is rated 100 hp. at 3400 r.p.m., with an aluminum head and a compression ratio of 6.5 to 1. Full length water jacketing is said to reduce the crankcase-oil temperature by 50 to 75 deg. F. In addition, the engine features a water-distributing tube for more uniform cooling of cylinder walls. The aluminum pistons are anodized for greater surface hardness.

The automatic overdrive increases the fuel economy.

An all-adjustable front seat incorporates a crank mechanism which permits moving the seat both fore-and-aft and up-and-down, to suit the convenience of the occupants.

Hydraulic brakes with centrifuse drums, and the hypoid rear axle are continued unchanged. The bar-type front sway stabilizer is continued, being mounted in bearings on the frame. The front-spring frequency is 90 to 100 per minute. Taper semi-elliptic springs are used.

The wide front of the Airflow permits the use of a full-width front seat with plenty of room for three. The rear seat, too, is wider and roomier, and both front and rear compartments provide generous leg room. By raising the moulding over the windshield approximately 2 in., the driver's

vision is greatly improved. Instruments are set off in colors to harmonize with the interior trim. Two compartments, one at each end of the instrument panel, provide space for gloves, maps and small packages. Two ash receivers, one of which can be removed for the installation of radio

dials, and a clock in the right hand compartment door, are useful as well as decorative features.

Air circulation may be regulated to suit the individual taste. The two windshields can be opened by cranks above the instrument board, while the two screened cowl ventilators are operated by handles below the board.

The sedan has been redesigned to include a trunk with space sufficient to permit easy handling of the spare wheel and tire. The trunk is fitted with a cam-type lock that cannot be pried open. On the Airflow Coupe, the spare wheel and tire are enclosed within the body. Luggage is carried back of the seat.

A completely restyled Airstream line, with mechanical features unchanged, is offered by De Soto in two models—deluxe and custom—both mounted on a chassis of 117-in. wheel-

Market with Restyled and Airflow Models

base. Body models in both lines include a touring sedan, touring brougham, and coupe. The custom line, in addition, includes a convertible coupe and convertible sedan.

Frontal appearance is greatly enhanced by the introduction of a rounded radiator—reminiscent of the earlier De Soto's, but modernized. Hood louvers are fashioned in wing-like sections. Torpedo-shaped headlamps mounted on brackets and speed-lined tail lights, all add to the smartness of the job. In the custom line, a further touch is added by the V-type windshield slanting from a chromium center bar.

The engine is continued with a number of refinements. It is a six-cylinder, L-head type of 3 $\frac{3}{4}$ by 4 $\frac{1}{2}$ -in. bore and stroke, rated at 93 hp. at 3400 r.p.m. The cylinder head is of cast iron and the compression ratio is 6.0 to 1. Full-length water jackets are provided to reduce the crankcase-oil temperature. Automatic spark control is used. The aluminum pistons are anodized. A floating power mounting is employed.

Clutch performance and service life have been improved by more energetic cooling. The main pressure plate is provided with ribs that serve as fan blades.

The automatic over-drive or "gas-saver" transmission combination is available on both deluxe and custom models at extra cost. The silent hy-

poid rear axle is standard on the custom line, and is supplied on deluxe jobs when the overdrive is specified.

The Syncro-silent helical gear transmission introduced last year is continued unchanged but the mounting of the gear shift lever has been changed to minimize wobble.

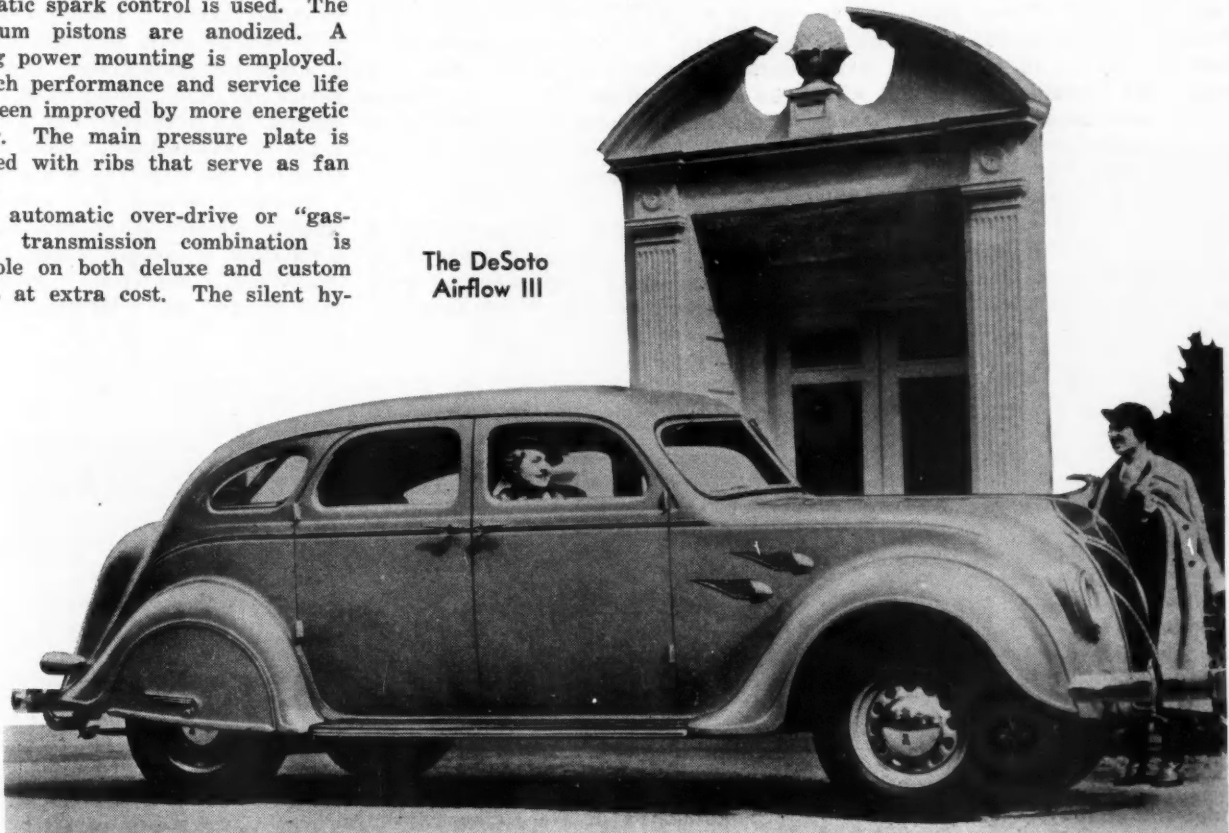
Bodies are of all-steel construction, with a steel roof panel which is flanged and bolted to the body panels. It is acoustically treated and electrically insulated to serve as a radio antenna.

The chassis frame has been redesigned so that it has twice the torsional rigidity of former models. In addition, it is shaped to conform to the body contour, so that the final assembly is greatly stiffened and strengthened by the rigidity of the body structure.

The distance between the windshield and the rear window line has been increased 4 $\frac{1}{2}$ in. and the shoulder space and elbow room also have been increased. Another innovation is the "chair-height" seats which come up under and support the knees. The back of the seat conforms naturally with the human form, giving correct support and lessening driving fatigue. A new type of footrest, which is said to virtually add 3 in. to the body interior, is recessed in the back of the front seat on four-door sedans.

On custom models the front windows are divided to give controlled ventilation. For maximum cooling the entire front-door windows, including ventilating wings, may be lowered completely. A large screened cowl ventilator is provided and the V-type windshield is fixed.

The DeSoto
Airflow III



Graham-Paige Concentrates on Sixes for Coming Season



Four-door Graham sedan with trunk

THREE new six-cylinder cars, distinctively styled, and all in the low price range are offered by Graham-Paige for 1936. These comprise the Crusader Six, Series 80, with a wheelbase of 111 in., in the lowest price range; the Cavalier, Series 90, with 115-in. wheelbase; and the Supercharger, Series 110, with 115-in. wheelbase. The latter introduces supercharging for the first time in the lower-priced field.

Cavalier and Supercharger models are mounted on the same chassis and use the same engine, except for modifications on the Supercharger. Bodies for both models include a rumble-proof steel roof.

Body styles comprise two-door and four-door sedans in all lines and a coupe in the Cavalier and Supercharger lines. Safety glass in windshields and windows is standard. Optional equipment at ex-

tra cost includes a new flexible-spoke steering wheel, new headlights, and twin horns, the horn motors being concealed in the back of the streamlined headlamps. All three cars have trunk models in which the spare wheel and tire are carried inside the body. Access to this compartment is through a lid at the rear of the body, hinged at its top.

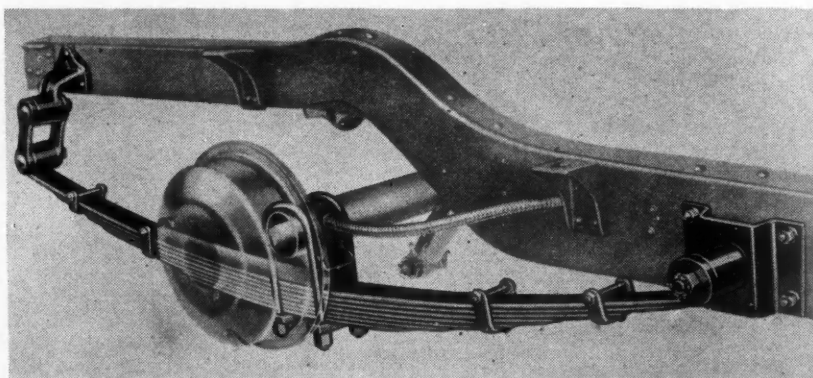
All models feature two-way, direct-acting hydraulic shock absorbers, rubber-cushioned and outboard-mounted semi-elliptic springs, an I-beam front axle, cam-and-lever steering with safety type three-spoke wheel, artillery-

type steel wheels, a semi-floating rear axle with spiral-bevel-gear drive, needle-bearing universals, a tubular propeller shaft, a silent transmission with helical gears and synchronizers, a single dry-plate clutch, and tilt-ray headlamps with foot-operated dimmer control. An overdrive with 0.709 to 1 ratio is available at extra cost on Cavalier and Supercharger models.

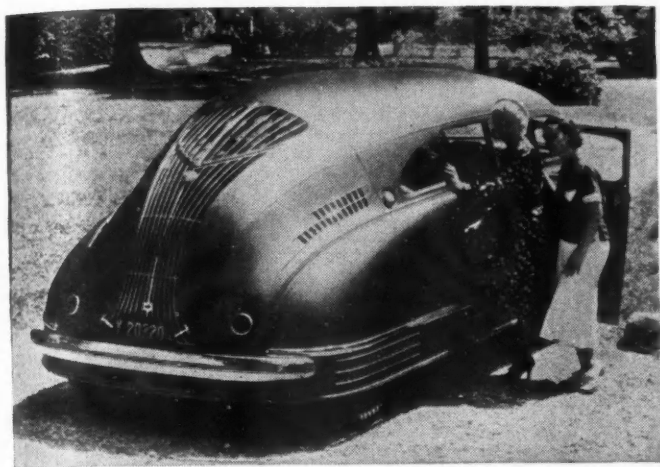
Engines continue the use of full-length cylinder water jackets, pump circulation of cooling water, pressure lubrication, downdraft carburetion, thermostatic water-temperature control,

positive crankcase ventilation, ventilated generators and rubber-cushioned engine mountings. Engines feature aluminum cylinder heads and aluminum pistons with invar struts.

The Cavalier engine has 3¼ by 4¾-in. cylinders, making the displacement (Turn to page 606, please)



Rear springs on all Graham models are widely spaced and cushioned in live rubber



Modernistic lines of the rear of the Stout Scarab car. The engine is in the rear and this view shows the engine cover which in a front engine car we would call the hood. Radiator grille in this car is at the rear instead of the front. Passengers step directly into the body as there is no running board.

SINCE William B. Stout first announced his Scarab car in January last he has been testing it on the roads from Coast to Coast. Recently an artist has been at work to improve the exterior lines and the interior appointments, and a new and more graceful model has been developed on which it is planned to start production. A photograph of the new model is shown herewith.

The doors of this new Scout Scarab are opened by pressing electric push

buttons. A new instrument panel has been designed and the upholstery has been further improved. Dials on the instrument board are lighted indirectly. The body has been more thoroughly insulated against heat and sound.

No change has been made in the structural features of the car. The eight-cylinder V-type engine at the rear is separated from the passenger compartment by a double sound-proofed bulkhead. At the front of the car a short dummy hood covers the spare wheel and baggage compartment. With the engine in the rear the distance from it to the rear axle is quite short

Stout Announces A New Scarab

and the conventional long propeller shaft has been eliminated. All controls are in front of the front seat at the left.

As on the original Scarab, the springing resembles that of the airplane landing gear, but improvements have been made in it to give better steering control on rough roads.

A feature of the car is that it has no separate chassis frame. The body is designed on the lines of an airplane fuselage to give great rigidity without excessive weight. The weight of the seven-passenger car is less than 3000 lb. Seats can be arranged at will and even converted to Davenport couches. There is a table which can be set up when it is needed, and the whole interior is more suggestive of a small yacht or cruiser than of an automobile. The price of the car has been set at \$5,000.



Because of its great interior roominess the Stout Scarab car gives the impression of great size. It is no longer in over-all length however than some of our lower-price cars. Full advantage is taken of the wheelbase however as there is very little overhang, and the passengers are all seated between the axles and not over them. Airplane suspension provides remarkably easy riding.

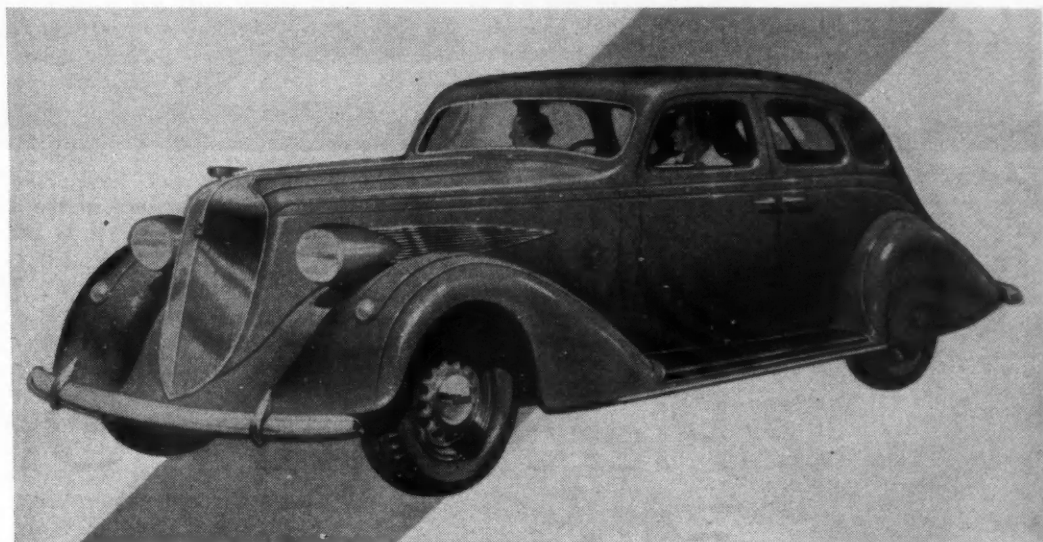


Condensed Engine and Chassis Specifications: The 1936 Passenger Cars

Complete revised specifications will appear in the Annual Statistical Issue of Automotive Industries to be published during the month of February, 1936

MAKE AND MODEL	Wheelbase (In.)	Tire Size (In.)	ENGINE										CHASSIS										Lowest Priced, 2 Pass., 4 door Sedan
			No. of Cylinders Bore and Stroke	Tasable H. P.	Piston Displacement	Maximum Brake H.P. at Specified R.P.M.	Comp. Ratio	Cylinder Head	Valve Arrangement	Piston Material	No. Main Bearings	Engine Temper- ature Control	Clutch	Gears	Univer- sals	Rear Axle	Springs		Brakes (Make)				
																	Front (Type and Length)	Rear (Type and Length)					
Auburn.....654	120	6.00/16	6-3 1/2x4 1/2	22.5	209.9	85-3500	6.20	AL	L	Als	4 Th	P. Long	3-W-G	Nb-Mec	1/2 Col	S-38	S-54 1/2	BH	795				
Auburn.....852	127	6.50/16	8-3 1/2x4 1/2	30.0	279.9	115-3600	6.20	AL	L	Als	5 Th	P. Long	3-Det	Nb-Mec	1/2 Col	S-42	S-56 1/2	BH	1095				
Auburn.....SC852	127	6.50/16	8-3 1/2x4 1/2	30.0	279.9	150-4000	6.50	AL	L	Als	5 Th	P. Long	3-Det	Nb-Mec	1/2 Col	S-42	S-56 1/2	BH	1545				
Austin.....	75	3.75/18	4-2.2x3	7.8	45.6	13-3200	5.3	.....	L	Al	2 No	P.....	3-W-G	f.Spi	1/2 Sal	Tr-28 1/2	1/2e22 1/2	M	.....			
Buick.....36-40	118	6.50/16	8-3 1/2x3 7/8	30.6	233.0	93-3200	5.55	CI	I	Ala	5 Th	P. B&B	3-Own	m. Spi	1/2 Own	Ind-C	S-54 1/2	BH	885				
Buick.....36-60	122	7.00/15	8-3 1/2x4 1/2	37.8	320.2	120-3200	5.45	CI	I	Ala	5 Th	P. Long	3-Own	m. Spi	1/2 Own	Ind-C	S-55 1/2	BH	1090				
Buick.....36-80	131	7.00/16	8-3 1/2x4 1/2	37.8	320.2	120-3200	5.45	CI	I	Ala	5 Th	P. Long	3-Own	m. Spi	1/2 Own	Ind-C	S-57 1/2	BH	1255				
Buick.....36-90	138	7.50/16	8-3 1/2x4 1/2	37.8	320.2	120-3200	5.45	CI	I	Ala	5 Th	P. Long	3-Own	m. Spi	1/2 Own	Ind-C	S-59	BH	1695				
Cadillac.....V 8-60	121	7.00/16	8-3 1/2x4 1/2	36.4	322.	125-3400	6.25	CI	L	Ala	3 Th	dp. Long	3-Own	Nb-Mec	1/2 Own	Ind-C	S-54 1/2	BH	1695				
Cadillac.....V 8-70 & 75	131-38	7.50/16	8-3 1/2x4 1/2	39.2	346.	135-3400	6.25	CI	L	Ala	3 Th	dp. Long	3-Own	Nb-Mec	1/2 Own	Ind-C	S-61 1/2	BH	2445				
Cadillac.....V 12-80 & 85	131-38	7.50/16	12-3 1/2x4	46.9	368.	150-3600	6.00	CI	I	Ala	4 Au	dp. Own	3-Own	Nb-Mec	1/2 Own	Ind-C	S-61 1/2	BH	3145				
Cadillac.....V 16-90	154	7.50/17	16-3x4	57.5	452.	185-3800	6.00	CI	I	Ala	5 Au	dp. Own	3-Own	Nb-Mec	1/2 Own	Ind-C	S-66	KP	7550				
Chevrolet.....Mas. Con.	113	5.50/17	6-3 1/2x4	26.3	206.8	79-3200	6.00	CI	I	CI	3 Th	P. Own	3-Own	m. Own	1/2 Own	S-36	S-54	OH	.....			
Chevrolet.....Master	113	5.50/17	6-3 1/2x4	26.3	206.8	79-3200	6.00	CI	I	CI	3 Th	P. Own	3-Own	m. Own	1/2 Own	Ind-C	S-54	OH	.....			
Chevrolet.....Std.	109	5.25/17	6-3 1/2x4	26.3	206.8	79-3200	6.00	CI	I	CI	3 Th	P. Own	3-Own	m. Own	1/2 Own	S-36	S-49	OH	.....			
Chrysler.....Six	118	6.25/16	6-3 1/2x4 1/2	27.3	241.5	93-3400	6.00	CI	L	Al	4 Th	P. B&B	3-Own	Nb-Spi	1/2 Own	Ind-C	S-53 1/2	LH	.....			
Chrysler.....De Luxe 8	121	6.50/16	8-3 1/2x4 1/2	33.8	273.8	105-3400	6.20	CI	L	Al	5 Th	P. B&B	3-Own	Nb-Spi	1/2 Own	Ind-C	S-53 1/2	LH	.....			
Chrysler.....Airflow 8	123	7.00/16	8-3 1/2x4 1/2	33.8	323.5	115-3400	6.20	CI	L	Al	5 Th	P. B&B	3-Own	Nb-Spi	1/2 Own	S-44 1/2	S-56 1/2	LH	.....			
Chrysler.....Airf w Im. 8	128	7.50/16	8-3 1/2x4 1/2	33.8	323.5	130-3400	6.5	Al	L	Al	5 Th	P. B&B	O-T	Nb-Spi	1/2 Own	S-44	S-56 1/2	LH	.....			
Cord.....	810	125	6.50/16	8-3 1/2x3 3/4	39.2	288.6	125-3500	6.5	Al	Al	3 Th	P. Long	4-Own	Tu-Own	Ind-Tr	S-54 1/2	WH			
De Soto.....Airstream 6	117	6.25/16	6-3 1/2x4 1/2	27.3	241.5	93-3400	6.00	Al	L	Al	4 Th	P. B&B	3-Own	Nb-Spi	1/2 Own	Ind-C	S-53 1/2	LH	.....			
De Soto.....Airflow 6	115 1/2	6.50/16	6-3 1/2x4 1/2	27.3	241.5	100-3400	6.50	Al	L	Al	4 Th	P. B&B	3-Own	Nb-Spi	1/2 Own	S-43 1/2	S-55	LH	.....			
Dodge.....Six	116	6.00/16	6-3 1/2x4 1/2	25.3	217.8	87-3600	6.5	CI	L	Als	4 Th	P. B&B	3-Own	Nb-U-P	1/2 Own	S-37 1/2	S-53 1/2	LH	735				
Duesenberg.....J	142-153 1/2	7.00/19"	8-3 1/2x4 1/2	45.0	419.7	320-4200	5.2	CI	Oh	Al	5 Th	dp. Long	3-Own	m. Spi	1/2 Own	S-41	S-62 1/2	PH	.....			
Ford.....V 8	112	6.00/16	8-3 1/2x3 3/4	30.0	221.0	90-3800	6.3	Al	L	Al	3 Th	P. Own	3-Own	m. Own	1/2 Own	Tr-40 1/2	Tr-46 1/2	OM	580				
Graham.....80	111	5.25/17	6-3x4	21.6	169.6	70-3500	6.8	Al	L	Als	4 Th	P. Ill.	3-W-G	Nb-Spi	1/2 Spi	S-38	S-60 1/2	LH	.....			
Graham.....90	115	6.00/16	6-3 1/2x4 1/2	25.3	217.8	85-3300	6.7	Al	L	Als	4 Th	P. Ill.	3-W-G	Nb-Spi	1/2 Spi	S-39	S-54	LH	.....			
Graham.....Sup. Ch. 110	115	6.25/16	6-3 1/2x4 1/2	25.3	217.8	112-4000	6.7	Al	L	Als	4 Th	P. Ill.	3-W-G	Nb-Spi	1/2 Spi	S-39	S-54	LH	.....			
Hudson.....6-63	120	6.00/16	6-3x5	21.6	212.0	93-3800	6.25	CI	L	Al	3 Th	†P. Own	3-Own	Nb-Spi	1/2 Own	S-33	S-52	BH	.....			
Hudson.....Eight	120-127	6.25/16	8-3x4 1/2	28.8	254.4	113-3800	6.00	CI	L	Al	5 Th	†P. Own	3-Own	Nb-Spi	1/2 Own	S-33	S-52	BH	.....			
Hupmobile.....618-G	118	6.00/16	6-3 1/2x4 1/2	29.4	245.3	101-3600	5.75	CI	L	Als	4 Th	P. B&B	3-W-G	Nb-U-P	1/2 Spi	S-42	S-54	LH	855				
Hupmobile.....621-N	121	6.50/16	8-3 1/2x4 1/2	32.5	303.2	120-3500	5.80	CI	L	Als	4 Th	P. B&B	3-W-G	Nb-U-P	1/2 Spi	S-43 1/2	S-56	LH	1035				
LaFayette.....1936	113	6.00/16	6-3 1/2x4 1/2	25.3	217.8	83-3200	5.61	CI	L	Als	7 Th	P. B&B	3-Own	Nb	1/2 Own	S-43	S-54	BH	675				
LaSalle.....36-50	120	7.00/16	8-3x4 1/2	28.8	248.0	105-3600	6.25	CI	L	Ala	5 Th	P. B&B	3-Own	Nb-Mec	1/2 Own	Ind-C	S-54 1/2	BH	1225				
Lincoln.....V-12-136	136	7.50/17	12-3 1/2x4 1/2	46.8	414.0	150-3400	5.58	Al	L	Al	4 Th	P. Long	3-Own	m. Spi	FF Tim	S-42	S-62	BP	.....			
Lincoln.....V-12-145	145	7.50/17	12-3 1/2x4 1/2	46.8	414.0	150-3400	5.58	Al	L	Al	4 Th	P. Long	3-Own	m. Spi	FF Tim	S-42	S-62	BP	.....			
Nash.....Ambassador	125	6.25/16	6-3 1/2x4 1/2	27.3	234.0	90-3400	5.7	CI	I	Als	7 Th	P. B&B	3-Own	Nb-Mec	1/2 Own	S-	S-54	BH	.....			
Nash.....Amb. Super 8	125	6.50/16	8-3 1/2x4 1/2	31.2	260.8	102-3400	5.25	CI	I	Als	9 Th	P. B&B	3-Own	Nb-Mec	1/2 Own	S-	S-54	BH	.....			
Nash.....400	117	6.00/16	6-3 1/2x4 1/2	27.3	234.0	90-3400	5.58	CI	L	Als	7 Th	P. B&B	3	Nb	1/2 Own	S-43	S-54	BH	.....			
Oldsmobile.....F-36	115	6.50/16	6-3 1/2x4 1/2	26.3	213.3	90-3400	6.00	CI	L	Al	4 Th	P. B&B	3-Own	Nb-Mec	1/2 Own	Ind-C	S-54 1/2	BH	.....			
Oldsmobile.....L-36	121	7.00/16	8-3x4 1/2	28.8	240.3	100-3400	6.20	CI	L	Al	5 Th	P. B&B	3-Own	Nb-Mec	1/2 Own	Ind-C	S-54 1/2	BH	.....			
Packard.....36-120B	120	7.00/16	8-3 1/2x4 1/2	33.8	282.0	120-3800	6.50	Al	L	Als	5 Th	P. Long	3-Own	Nb-Mec	1/2 Own	Ind	S-54	LH	1075				
Packard.....8	127-34-39	7.00/17	8-3 1/2x5	32.5	320.0	130-3200	6.50	Al	L	Als	9 Au	P. Long	3-Own	Nb-U-P	1/2 Own	S-42	S-60 1/2	BP	2385				
Packard.....Super 8	132-39-44	7.00/17	8-3 1/2x5	39.2	324.8	150-3200	6.30	Al	L	Als	9 Au	P. Long	3-Own	Nb-Spi	1/2 Own	S-42	S-60 1/2	BP	2990				
Packard.....Twelve	132-39-44	7.50/17	12-3 1/2x4 1/2	56.7	473.0	175-3200	6.40	Al	H	Als	4 Au	†P. Long	3-Own	Nb-Spi	1/2 Own	S-42	S-60 1/2	BP	3960				
Pierce-Arrow.....438	138-144	7.00/17	8-3 1/2x5	39.2	385.	150-3400	6.40	Al	L	Als	9 Au	dp. Long	3-Own	Nb-U-P	1/2 Own	Ind.	S-64	Ste	.....			
Pierce-Arrow.....1602	138-144	7.50/17	12-3 1/2x4	58.8	462.	185-3400	6.40	Al	L	Als	7 Au	dp. Long	3-Own	Nb-U-P	1/2 Own	S-44	S-64	Ste	.....			
Pierce-Arrow.....1603	147	7.50/17	12-3 1/2x4	58.8	462.	185-3400	6.40	Al	L	Als	7 Au	dp. Long	3-Own	Nb-U-P	1/2 Own	S-44	S-64	Ste	.....			
Plymouth.....P-1	113	5.25/17	6-3 1/2x4 1/2	23.4	201.3	82-3600	6.7	CI	L	Al	4 Th	P. B&B	3-Own	Nb-U-P	1/2 Own	S-38	S-53 1/2	LH	.....			
Plymouth.....P-2	113	6.00/16	6-3 1/2x4 1/2	23.4	201.3	82-3600	6.7	CI	L	Al	4 Th	P. B&B	3-Own	Nb-U-P	1/2 Own	S-38	S-53 1/2	LH	590				
Pontiac.....Master Six	112	6.00/16	6-3 1/2x3 7/8	27.4	208.0	80-3600	6.2	CI	L	Chl	4 Th	P. Own	3-Own	m. Own	1/2 Own	S-36	S-54	BH	720				
Pontiac.....De Luxe 6	112	6.00/16	6-3 1/2x3 7/8	27.4	208.0	80-3600	6.2	CI	L	Chl	4 Th	P. Own	3-Own	m. Own	1/2 Own	Ind-C	S-54	BH	770				
Pontiac.....De Luxe Eight	116 1/2	6.50/16	8-3 1/2x3 1/2	33.8	223.4	87-3800	6.2	CI	L	Chl	5 Th	P. Own	3-Own	m. Own	1/2 Own	Ind-C	S-54	BH	815				
Reo.....Flying Cloud	115	6.25/16	6-3 1/2x4 1/2	27.3	228.0	90-3400	6.5	Al	L	Al	7 Th	P. B&B	3-W-G	Nb-Spi	1/2 Spi	S-39	S-54	LH	.....			
Studebaker.....Dict. 6	116	6.00/16	6-3 1/2x4 1/2	25.4	217.8	90-3400	6.3	CI	L	Ly	4 Th	P. B&B	3-W-G	Nb-Mec	1/2 Spi	S-37 1/2	S-54	LH	.....			
Studebaker.....Dict. 6	116	6.00/16	6-3 1/2x4 1/2	30.0	217.8	90-3400	6.3	CI	L	Ly	9 Th	P. B&B	3-W-G	Nb-Mec	1/2 Spi	Ind-Tr	S-54	LH	.....			
Studebaker.....Pres. 8	125	6.50/16	8-3 1/2x4 1/2	30.0	250.4	115-3600	6.5	Al	L	Ly	9 Th	P. Long	3-W-G	N									

Three New Models Supplement Earlier Nash Offerings



The 1936 Nash Ambassador Super Eight is 102 h.p. and has a wheelbase of 125 inches. Hoods are longer this year and the front end has been redesigned.

THREE new series of models have been announced by Nash for 1936, supplementing the Standard "400" Series Nash and 1936 Lafayette which were described in this publication several months ago.

The Nash line now consists of two Ambassadors—the Ambassador 6 and Ambassador Super 8, both mounted on a chassis of 125-in. wheelbase. In addition, there is a new deluxe series Nash "400" mounted on the 117-in. wheelbase Nash Series "400" chassis, which remains unchanged. The Standard "400" Series Nash as well as the recently introduced Lafayette remain unchanged.

Two body types—Victoria and four-door sedan, both six-passenger models with built-in trunk—are available on the Ambassador line. Both the Standard and deluxe series "400" are available in six body types—sedan, touring coupe, victoria, and touring victoria with trunk. In addition, a cabriolet is offered on the deluxe only. The two "400" lines are priced between the Lafayette and Ambassador. Base prices on the Standard start at \$665, on the deluxe at \$675.

Prices on the Lafayette line range from \$595 for the business coupe to

\$700 for the six-passenger, four-door sedan with trunk. In addition to the six body styles previously available on the Lafayette, a new convertible coupe, a three-passenger business coupe with rear quarter windows, and a five-passenger rumble seat coupe with rear quarter windows are now available.

Powerplants in the Ambassador line are stepped up; an automatic cruising gear boosts top speed, at the same time reducing gasoline and oil consumption and engine wear; springs have Silenite inserts between the leaves; steering has been made easier; super-hydraulic brakes are standard equipment and air-wheels are also available without extra cost. The all-steel Aeroform body with steel top has room for six passengers. The twin-ignition engines are retained in the Ambassador line substantially unchanged.

The Ambassador six engine is of 3½-in. bore, 4½-in. stroke, 234 cu. in. displacement, rated 90 hp. at 3400 r.p.m., with a compression ratio of 5.7 to 1. The Ambassador Super eight engine is of 3½-in. bore, 4½-in. stroke, 260.8 cu. in. displacement, rated 102 hp. at 3400 r.p.m., with compression ratio of 5.25 to 1.

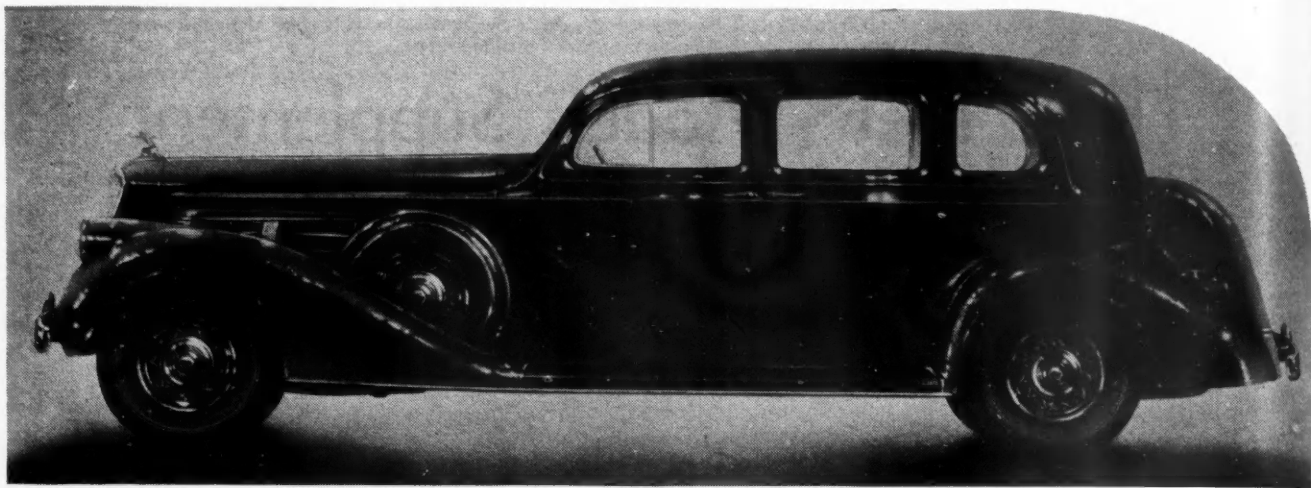
Nash "400" engine is 6-cyl. 3½-in. bore x 4½-in. stroke, 234 cu. in. dis-

placement, rated at 90 hp. at 3400 r.p.m., with compression ratio of 5.58 to 1. The Lafayette engine is 6-cyl. 3¼-in. bore x 4½-in. stroke, 217.8 cu. in. displacement, rated 83 hp. at 3200 r.p.m., with compression ratio of 5.61 to 1.

Mechanically both the Standard series and the deluxe series cars are the same, but whereas the deluxe line follows the general styling of the Ambassador series in appearance, having a conventional type hood and large die cast radiator grille, the Standard series hood and grille are constructed in one piece. A small door in the hood, located under the hinged radiator ornament, provides easy access to water and oil filler caps, making it unnecessary for filling station attendants to raise the hood when water and oil are needed.

Every model of the line has spare tire and luggage space in the rear slope of the body. The touring sedan and Victoria models have built-in trunks of generous size which conform to the streamlined body design. In both the business and rumble-seat coupes, spare tire and luggage space is located behind the front seat. Additional space, reached from outside, is also provided in the rear deck of the business coupe.

—J. G.



Rear seats are located 10 in. farther forward in the 1936
Pierce-Arrow



Front ends have been
modernized and increased
slope given to the grille

Pierce-Arrow Offers Eights and Twelves

AMONG the improvements made in Pierce-Arrow cars for 1936 are a new chassis frame, an increase in braking power, a new lighting system, improvements in the steering gear facilitating the handling of the cars, and more rugged bodies and bumpers. Engines are more powerful and have aluminum cylinder heads. New synchromesh transmissions are silent in all speeds and have built-in free-wheeling units. An automatic overdrive is fitted. Springs are longer and wider, and shock absorbers have been improved. Interiors are roomier. Rear seats are located 10 in. further forward to place the passengers well ahead of the rear axle. The instrument board has been rearranged, all instruments now being directly in front of the driver. Bodies have been further modernized, with more rakish radiator lines, and a new treatment has been given the front end.

The new Pierce line comprises an eight-cylinder and a twelve-cylinder group. In the eight-cylinder chassis the engine rating has been increased to 150 hp., although the cylinder dimensions have not been changed. Chassis come in two lengths of wheelbase, 138 in. and 144 in., and the group comprises five body models. One of the powerplant features is that the connecting rods are drilled to spurt oil onto both sides of the cylinder wall and to conduct oil to the piston-pin bearing.

Two twelve-cylinder groups are again being offered by the company. One of these, Model 1602, comes in two wheelbase lengths, 138 and 144 in., while the Model 1603 comes in a single wheelbase only, 147 in. Both are offered with seven body styles and both are powered by a V-type engine of 185 hp. (as compared with 175 hp. last year). No change has been made in the bore and stroke, but the compression ratio is now 6.4 to 1, where formerly it was 6 to 1.

An X-member has been added to the frame, while the box-section side-members and the three tubular cross-mem-

bers of large diameter have been retained. The overdrive, an entirely new feature with Pierce-Arrow, cuts in automatically at between 40 and 45 m.p.h. and reduces the overall reduction ratio of the car from 4.58 to 3.29.

Both of the engines are mounted on rubber biscuits at four points. Generators on both the eight- and the twelve-cylinder engines have larger output. A new muffler shows reduced back pressure. The cooling capacity has been increased. Front springs are 6 in. longer and ¼ in. wider, while rear springs are 4 in. longer. The center distance of the springs has been increased 4½ in. at the front and 5 in. at the rear. Stabilizers have been added to eliminate side sway. Houdaille-type shock absorbers are now standard equipment.

Three different adjustments of the headlamps are now possible, giving a driving beam for the open country, a passing beam and a beam for city driving. For passing, the cross-beam principle is made use of, the regular beams from the headlamps being depressed and a separate beam thrown across to the right-hand edge of the road.

Air-Conditioning System Now Available for Motor Vehicles

AN air-conditioning system for motor buses (which can be used also on motor ambulances, private automobiles, etc.) has been developed jointly by the Carrier Engineering Corporation of Newark, N. J., and the Houde Engineering Corporation of Buffalo, N. Y. Development work, carried out on a standard five-passenger car, has been in progress for about a year, and regular production is scheduled to begin shortly at the Buffalo plant of the Houde concern, under an arrangement with Carrier. Details of the system were given in a paper presented at a recent meeting of the National Association of Motor Bus Operators at New Orleans, of which paper Ralph F. Reo, vice-president of Houde Engineering Corp., and E. P. Heckel, vice-president of the Carrier Engineering Corp., were the joint authors.

The system is designed to circulate through the bus body, air that has been cooled, dehumidified, and cleaned of impurities, in such a way as to assure a maximum of comfort to passengers. The equipment required is sufficiently compact so that no passenger space need be sacrificed, and it takes only a moderate amount of power to operate, which is furnished directly by the bus engine.

Referring to the accompanying illustration, the system includes a cooling unit *B* with coil, mounted under the

roof of the bus, air being drawn over the cooling coil by a motor-driven fan *C* and forced through a duct *D* extending the length of the body and provided with outlets along its length. Provision can be made for control at individual outlets. There are two air inlets to the cooling unit, one admitting air from the inside of the bus, the other from the outside, and the two are so proportioned that approximately 25 per cent of the air is taken from the outside. This air from the outside is taken in through a filtering element.

The refrigerant used in this system,

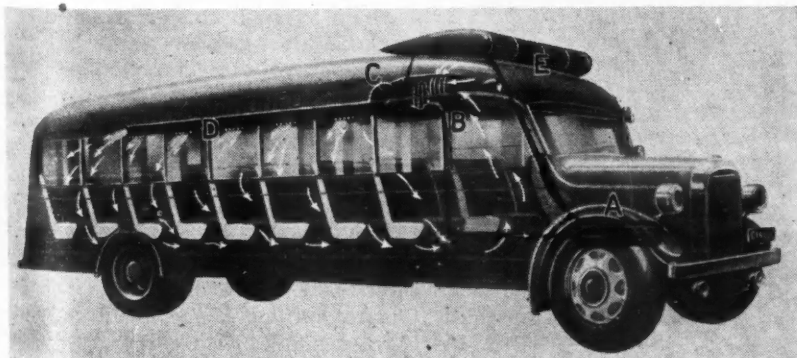
known as Carrene, is a comparatively new one, but is regularly used in a well-known household refrigerator and has been accepted without restrictions under municipal ordinances, we are informed. It is claimed to be safe under all conditions; being non-poisonous, non-asphyxiating and non-inflammable, and it has fire-extinguishing properties. It will not readily evaporate at temperatures under 105 deg. F., and it can be poured into the system in the same way as oil is poured into the engine crankcase to replenish the supply therein. The amount required for a bus cooling system is said to be about one gallon, and the rate of loss practically negligible.

Refrigerant enters the cooling coil in the liquid state; it evaporates in the coil, and the heat required to effect vaporization is withdrawn from the air passing through the cooling unit, which is the source of the refrigerating effect. One element of the system is a low-pressure compressor *A*, which supplies refrigerant to the cooling unit *B*. It is installed under the hood and is driven directly from the bus engine. This unit has no reciprocating and only few moving parts.

After the refrigerant has done its work in the cooling unit, it passes on to the condenser located on the roof of



Test car used as "proving ground" for the development of the system



Air-conditioning system installed in a bus

the bus, where it is cooled by the air stream. This unit may be given a streamline form to harmonize with the general lines of modern buses, and the advantage is claimed for this location that it advertises the bus as being air-conditioned.

The capacity of the system would be so proportioned that in hot weather it would reduce the temperature inside the bus by from 10 to 15 deg. below the outside temperature. This is in conformity with current practice in air-conditioning railroad coaches, theaters, etc. Tests have indicated that the circulation of 1500 cu. ft. of air per minute (25 cu. ft. per passenger), with 25 per cent outside air, is sufficient to dissipate odors and dilute smoke.

A conventional inter-city bus with seating capacity for 30-35 passengers has an external body surface of about 630 sq. ft. and a glass surface of approximately 115 sq. ft. A bus of this type, of good, tight construction and with the roof insulated and properly painted, requires about 60,000 B.t.u. to be abstracted per hour, which is equivalent to the heat absorbed by melting 425 lb. of ice per hour. Forty per cent more than this refrigerating capacity is allowed for in the case of railroad coaches.

In applying a refrigerating system to buses, it is found advisable to insulate the engine compartment from the bus proper, insulate the roof, and paint it a light color, and stop up all cracks where

unfiltered air from the outside might get in.

From the experimental work thus far done it is concluded that an installation suitable for a 30-passenger bus would weigh less than 600 lb., occupy about 27 cu. ft. of space (all of the elements together), and require less than 6 hp. to operate. The condenser on top of the roof need not be over 15 in. high, so it would not interfere with clearance.

Installation is greatly simplified if it is provided for in the design of the bus, as in that case all of the walls can be properly insulated and the use of double windows provided for, as well as light-reflecting shades and painting that reduces the pick-up of sun heat to a minimum.

Graham-Paige Concentrates on Sixes for Coming Season

(Continued from page 600)

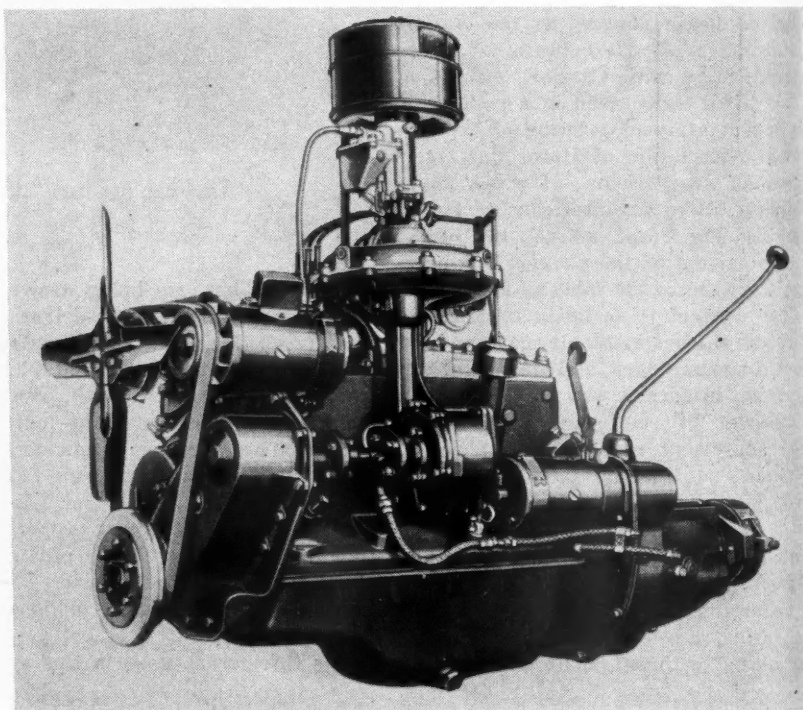
217.8 cu. in.; it is rated at 85 hp. at 3300 rpm., with aluminum cylinder head and 6.7 to 1 compression ratio. The Supercharger uses the same engine, but the centrifugal blower boosts the engine power 32 per cent, to 112 hp. at 4000 rpm. The Cavalier has a 1½-in. downdraft carburetor, while the Supercharger is fitted with a 1½-in. carburetor, both carburetors being equipped with economizers.

The Crusader engine has 3 by 4-in. cylinders, giving 169.6 cu. in. displacements; it is rated at 70 hp. at 3500 rpm., with aluminum head and compression ratio of 6.8 to 1.

Main bearings in all engines are of cadmium-silver alloy. Exhaust valves are Silchrome. The Crusader engine has three-point suspension in rubber; both Cavalier and Supercharger engines are mounted in rubber at four points. Cavalier and Supercharger have Champion 14 mm. spark plugs, the Crusader has Champion 18 mm. plugs.

Both front and rear passenger compartments are entirely between axles, which adds to the riding comfort.

The supercharger, designed and developed in the laboratories of Graham-Paige Motors Corp., is of the centrifugal type and noiseless in operation. It is expected to last the life of the car. It takes mixture from the carburetor, and the heat of compression and the turbulence produced by the vanes help to atomize and vaporize the fuel, thereby improving the distribution. Increased reserve power, providing the same degree of acceleration at 70 mph. as at 40 mph., is claimed for the Graham supercharger, with greatly increased economy at the higher speeds.



The Graham supercharger six engine

All three cars feature a girder-like, pressed steel frame, with side rails 5½ in. deep with wide flanges, and an X-type cross member that extends forward to form a K with the front cross member. All models have hydraulic brakes acting on manganese-steel drums. The Crusader has 9-in. drums, the other two models, 11-in. Molded linings, 1¼ in. wide, are standard. In the Crusader, the hand brake operates the rear service brake shoes me-

chanically, while in the Cavalier and Supercharger the hand brake is entirely separate from the service brake and operates on a drum at the rear of the transmission.

The steering gear is of the cam-and-lever type, fully adjustable, with three-spoke wheel of 17-in. diameter. Chassis springs are semi-elliptic, outboard mounted, with rubber cushioned spring eye and shackle bolts; spring bolts require no lubrication.

Two Chassis Sizes For 1936 Hupps

(Continued from page 595)

new front grille in combination with hood louvres which harmonize with the streamline form. There are additional louvres beneath the grille which result in an increased flow of air over the top of the radiator, lowering the air temperature at the carburetor inlet for improved performance in hot weather.

From the mechanical standpoint the most interesting innovation is an over-drive which cuts in automatically at car speeds of 45 m.p.h. and reduces the engine speed by 30 per cent for any road speed above this figure.

The engines are claimed to be exceptionally smooth, due to the use of very heavy crankshafts, that of the six-cylinder weighing 96, and that of the eight-cylinder 108½ lb. Carburetors are now provided with an anti-percolating device. A 1¼-in. carburetor is used on the Six and a dual 1-in. carburetor on the eight-cylinder. The carburetors are provided with an accelerating pump, and the manifolds have automatic heat control.

Frames are of the X-member type and side rails have a maximum section 6½-in. deep. On the eight-cylinder car the well-known Hupp system of front-end torsional bracing is continued.

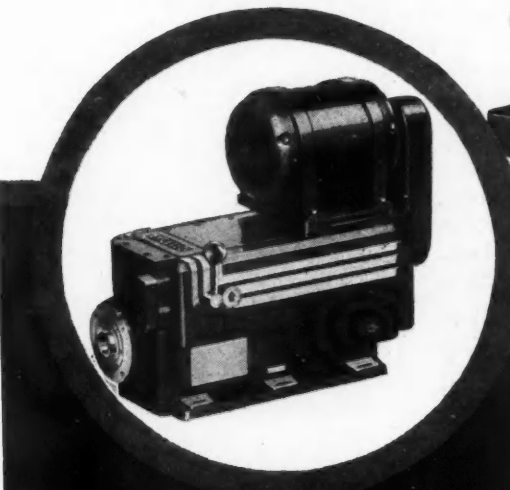
Full-Balloon Tires

The tire size is 6.00-16 on the Six and 6.50-16 on the Eight, both of these being full balloon-type tires. Springs are semi-elliptic, the front being overlung and the rear underslung. On the Six the rear springs are 54 in. long; on the Eight, 56 in. Front springs on the Six are 42 in.; on the Eight, 43¼ in. Two-way hydraulic, thermostatically and automatically-controlled shock absorbers are used both front and rear.

Service brakes are hydraulic, while the hand brake is of the mechanical type and operates on the rear wheels. A total of 166 sq. in. of braking surface is available on the Six, 201 sq. in. on the Eight. The entire braking system is fully enclosed. On the Six the steering gear is of the cam-and-lever type, with 17-in. steering wheel; on the Eight it is of the roller-follower type, with 18-in. steering wheel.

The electrical system is of the latest Autolite type, comprising a fan-cooled, belt-driven generator having improved charging characteristics. On the Six a battery of 100-amp. hrs. capacity is carried; on the Eight, one of 119-amp. hrs. Two gear ratios are available, 4.27 to 1 and 4.09 to 1, the former being standard and the latter optional.

EX-CELL-O HYDRAULIC POWER UNITS



EX-CELL-O
HYDRAULIC
POWER UNIT
DRILLING
MACHINE



Flexibility; a wide range of operating cycles; quick and economical change-over from one operation to another—these are the precise qualities which Ex-Cell-O Hydraulic Power Units bring to the machines on which they are used.

They are compact, rigid, self-contained. Easily adapted, either "designed-in" as part of new machines, or as modernizing units on redesigned machines. They may be mounted in vertical, horizontal or angular positions, and easily adjusted to meet the demands of each individual installation.

They have proven their ability to pay for themselves many times over. Complete specifications and data sheets are available for the asking.

EX-CELL-O

AIRCRAFT
& TOOL

CORPORATION

DETROIT,
MICHIGAN

Four Six-Cylinder Models Make Up Reo Line for 1936

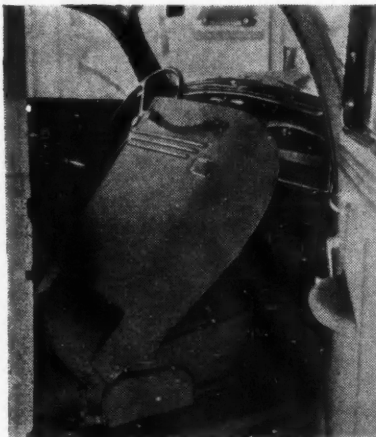
(Continued from page 591)

throughout, amply braced and welded for added strength and safety. Wood trim rails have been eliminated, the upholstery being fastened to the framework by means of snap type clips. The steel roof panel is insulated by the use of wood filler strips along outside edges and rubber lined. It is bolted to the upper body panel corners, the fastenings being insulated by thin fiber washers.

In the deluxe brougham, folding seats are of an original design assuring accommodation for three people. Construction is such that an unbroken line is maintained across the back, giving greater room and more comfort than the conventional bucket seats.

The instrument panel is designed in a conservative modern manner. It features a large package compartment and full vision instruments. The shift-

Folding seats of an original design are featured in the new Reo De Luxe Brougham models



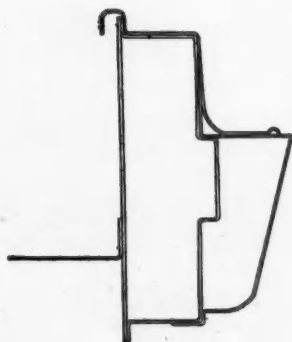
ing lever ball, throttle and choke knobs are of tenite.

Improved appearance as well as ample baggage space are obtained by the use of a built-in trunk which is available at slight extra cost. Further body refinements include easy acting non-rattle door hinges, and latch controls. Two ash trays are fitted in the back of the front seat; a new dash ash tray, and a spot for radio controls also are provided.

Custom treated upholstery is available in two varieties—mohair or treebark—and is finished in deluxe-type pleating. Seat cushion material is carried up the sides to the headlining throughout the car and is set off with leather piping. Front and back compartment floors in deluxe models are covered with long wearing plush carpets.—J. G.

Front Drive Cord with New System of Independent Suspension Makes Initial Bow

(Continued from page 584)



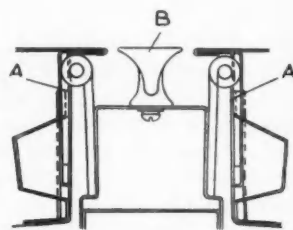
Full box section of body sill used in the new Cords

body. Tail lights are set flush into the lower part of the lid or door for the tire compartment, and when this

lid is opened these lights flood the entire compartment with light, enabling the driver to get out baggage or the spare tire easily. The license number plate is located in the center of the rear deck lid, thus reducing wind resistance.

Leading the Auburn offerings for 1936 is the 150 h.p. speedster model of the supercharged line. Basically unchanged in mechanical features, the regular Auburn line comprises the following models:

Six-cylinder, 85 h.p., line in five body styles, a four-door sedan; two-door brougham; five-passenger convertible phaeton sedan; convertible cabriolet and business man's coupe. The 115 h.p. straight eight line is offered in the same body styles. Available in the 150 h.p. super-charged line are the convertible phaeton sedan; four-door sedan; two-door brougham; business

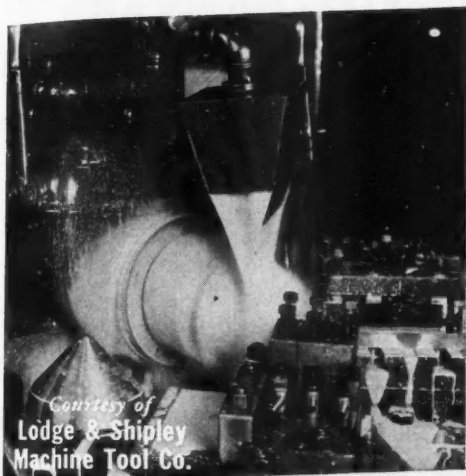


Detail of center pillar of the Cord bodies

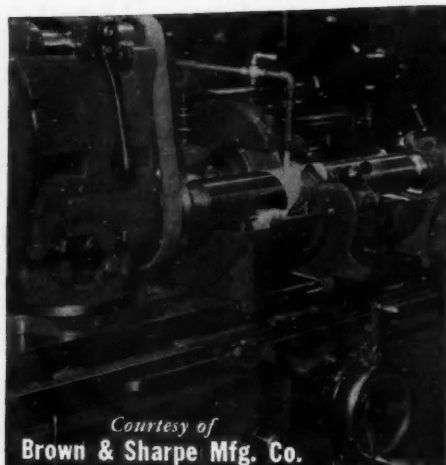
man's coupe; convertible cabriolet and speedster models.

The straight-eights are mounted on 127 in. wheelbase chassis; the sixes on a 120 in. wheelbase. Mechanical features, including dual ratio drive, are continued unchanged.

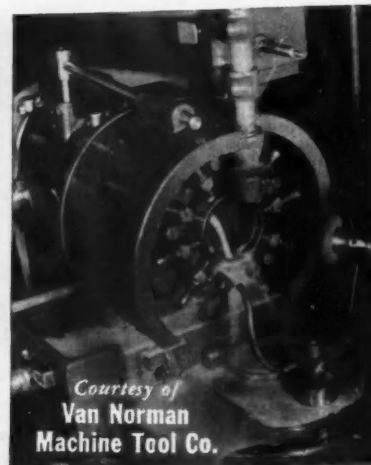
RECORDS *with* SUNOCO



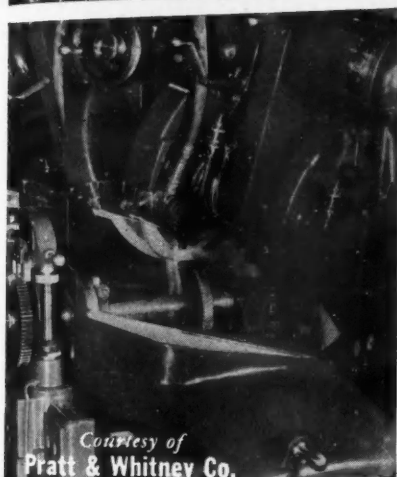
Courtesy of
Lodge & Shipley
Machine Tool Co.



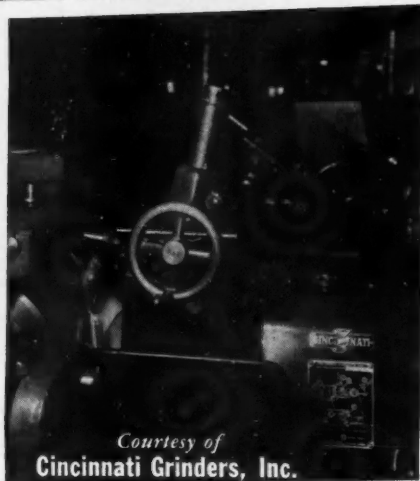
Courtesy of
Brown & Sharpe Mfg. Co.



Courtesy of
Van Norman
Machine Tool Co.



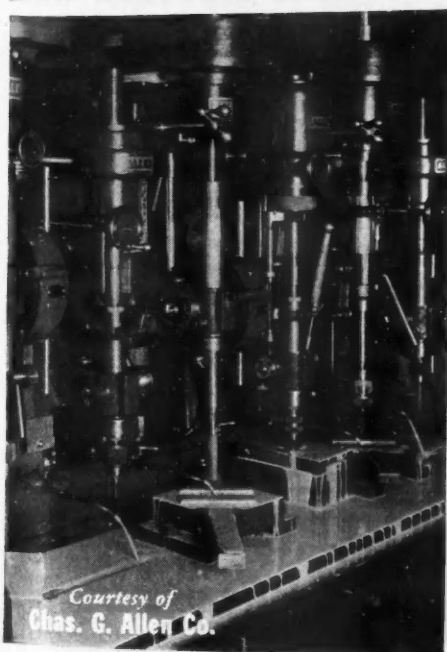
Courtesy of
Pratt & Whitney Co.



Courtesy of
Cincinnati Grinders, Inc.



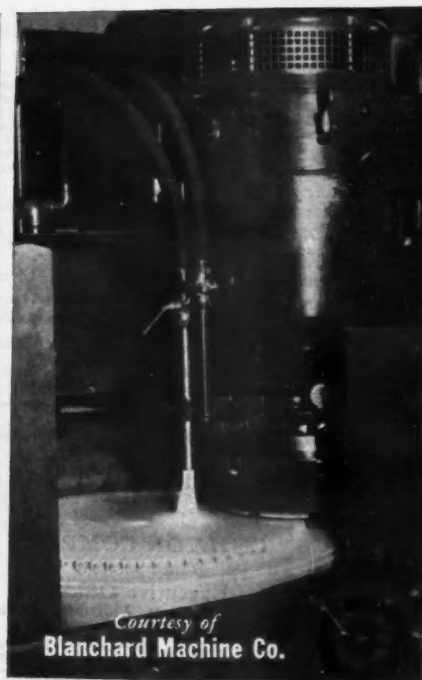
Courtesy of
Sundstrand
Machine Tool Co.



Courtesy of
Chas. G. Allen Co.



Courtesy of
Carlton Machine Tool Co.



Courtesy of
Blanchard Machine Co.

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

Reg. U. S. Pat. Off.
Published Weekly

Volume 73

Number 19

JULIAN CHASE, Directing Editor

HERBERT HOSKING, Editor
P. M. HELDT, Engineering Editor
JOS. GESCHELIN, Detroit Technical Editor
HAROLD E. GRONSETH, Detroit News Editor

JEROME H. FARRIS, Ass't Editor
T. LAWTON SLAUGH, News Editor
ALFRED F. WADDEL, Ass't Editor
GEOFFREY GRIER, Art Editor

Contents

News of the Industry	609
Calendar of Coming Events	619
Sales of the "Lower Bracket" Cars in September Top Same Month's Sales in 1934 by \$12,000,000	620
The Horizons of Business	622
Business in Brief	623
Streamlining and High-Performance Cars Dominate the New Models at Olympia Show. By M. W. Bourdon	624
Automotive Abstracts	628
Cord Has Bendix Vacuum Gear Shift in New Front Drive	629
Removal of French Horsepower Tax Boosts Average Displacement 20%	630
Just Among Ourselves	631
Electric Auto-Lite Centers Research for Subsidiaries at Toledo	632
Highlights of 1936 Production Developments. By Joseph Geschelin	634
Production Lines	636
New Developments	638
Advertisers' Index	53

C. A. MUSSELMAN, Pres. and Gen. Mgr.; J. S. HILDRETH, Vice-Pres. and Manager; W. I. RALPH, Vice-Pres.; G. C. BUZBY, Vice-Pres.

OFFICES

Philadelphia—Chestnut & 56th Sts., Phone Sherwood 1424.
New York—239 W. 39th St., Phone Pennsylvania 6-1100. Chicago—Room 1116 London Guarantee & Accident Bldg., Phone Franklin 9494. Detroit—814 Stephenson Bldg., Phone Madison 2090. Cleveland—809 Guardian Bldg., Phone Main 6860. Boston—301 United Shoe Bldg., Phone Liberty 4460. San Francisco—444 Market St., Room 305, Phone Garfield 6788. Long Beach, Cal.—1595 Pacific Ave., Phone Long Beach 613-238.
Cable Address Autoland, Philadelphia

SUBSCRIPTION RATES: United States, United States Possessions, and all countries in the Postal Union, \$1.00 per year; Canada and Foreign, \$1.00 per year. Single Copies, 25c.

Member of the Audit Bureau of Circulations
Member Associated Business Papers, Inc.

Entered as second-class matter Oct. 1, 1925, at the post office at Philadelphia, Pa., under the act of March 3, 1879.
Automotive Industries—The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903, the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

Owned, Published and Copyrighted by



CHILTON COMPANY
(Incorporated)

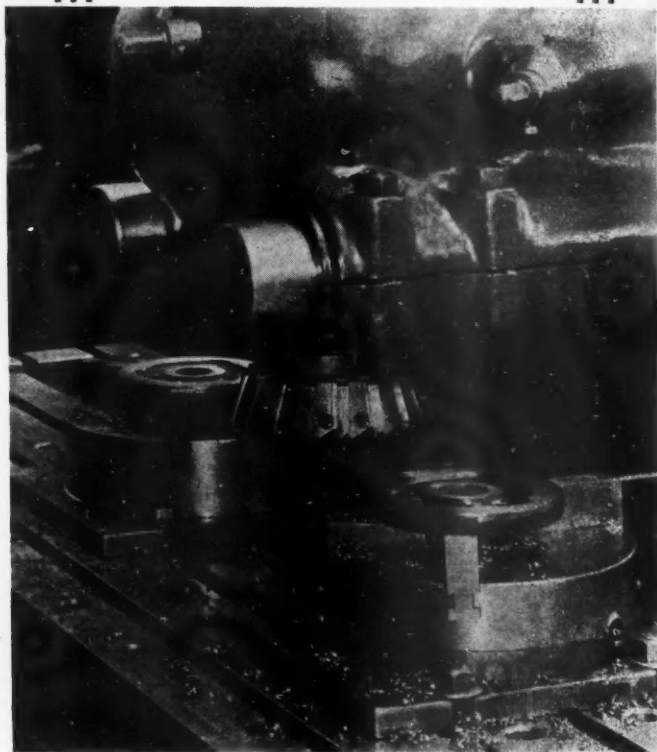
Executive Offices

Chestnut and 56th Streets, Philadelphia, Pa., U. S. A.

C. A. MUSSELMAN, President
FRITZ J. FRANK, Executive Vice-President
FREDERIC C. STEVENS, JOSEPH S. HILDRETH, GEORGE H. GRIFFITHS, EVERETT B. TERHUNE, ERNEST C. HASTINGS, Vice-Presidents
WILLIAM A. BARBER, Treasurer. JOHN BLAIR MOFFETT, Secretary

November 9, 1935

The Cleveland Show DEMONSTRATED THE SUPERIORITY OF VASCOLOY-RAMET



HERE'S ADDITIONAL PROOF

Chrome Nickel Steel (3140) forged gear blanks 6" diameter x 3/4" thick. Both sides faced. Over 400 pieces milled before the cutter needed grinding.

Now--Proof in your own Plant

This can be accomplished by writing or phoning our various district offices. They will send an engineer to render assistance on your production problems in your own plant.

TANTALUM CARBIDE
VANADIUM-ALLOYS STEEL CO.

District Offices:

DETROIT 5223 Trumbull Ave. Southfield 6100
CLEVELAND 2121 St. Clair Ave. Prospect 2006
SPRINGFIELD 240 Plainfield St. Springfield 6436
ST. LOUIS 712 Cass Ave. Central 9164
CHICAGO 1440 W. Randolph St. Haymarket 4843
CINCINNATI 405 Monmouth Liberty Bldg. Main 2229

VANADIUM-ALLOYS STEEL CO.

PITTSBURGH

[All Vascoloy-Ramet orders and inquiries should be directed to: Vanadium-Alloys Steel Company, 1440 West Randolph St., Chicago, Ill.]